TRANSACTIONS
OF THE
AMERICAN DENTAL
ASSOCIATION.
1867.

Serial
v. 7
1867
Columbia University
in the City of New York
School of Dental and Oral Surgery

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TRANSACTIONS

OF THE

American Dental Association.

Held in Cincinnati,

JULY 30TH TO AUGUST 3RD INCLUSIVE, 1867.

CINCINNATI:
WRIGHTSON & COMPANY, PRINTERS, 167 WALNUT ST.,
1867.

DISCLAIMER.

The American Dental Association, although formally accepting and publishing the report of the various standing committees, and essays, read before the Association, holds itself wholly irresponsible for the opinion, theories, or criticisms therein contained, except when so decided by special resolution. — *Constitution.*

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TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION.

THE seventh regular annual meeting of the American Dental Association, was held in Hopkins' Music Hall, at Cincinnati, July 30th, 1867.

The Association was called to order by the President, Dr. C. P. Fitch, of New York, at 10½ A. M.

The meeting was opened with prayer by Rev. Henry D. Moore. After which an address of welcome was delivered by Dr. James Taylor, of Cincinnati, for which a vote of thanks was given by the Association and a copy requested for publication.

The roll was now called, when the following permanent members answered to their names: C. P. Fitch, John Allen, W. H. Atkinson, George Watt, J. Taft, H. R. Smith, C. Sill, C. W. Spalding, H. E. Peebles, George T. Barker, J. F. Flagg, B. M. Gildea, P. G. C. Hunt, A. S. Talbert, W. W. Allport, J. F. Johnston, R. W. Varney, H. A. Smith, C. Palmer, B. T. Spelman, C. R. Butler, T. L. Buckingham, Samuel Wardle, J. G. Cameron, A. E. Lyman, J. A. McClelland, James Taylor, I. J. Wetherbee, J. Chesebrough, L. D. Shepard, A. H. Eames, S. Driggs, W. N. Morrison, A. B. Robbins, G. B. Snow, W. P. Horton, E. A. Bogue, I. A. Salmon, A. Lawrence, M. S. Dean, A. Berry, H. S. Chase, C. H. Harroun, George W. Keely, J. A. Kennicott, W. H. Morgan, E. H. Kilbourne, W. Taft, G. L. Paine, N. W. Williams, C. C. Carroll, J. Knapp, B. Bannister, George L. Field, W. F. Morrill, J. K. Jameson, H. J. McKellops, W. H. Goddard, Joseph Richardson, J. A. Harris.

The Committee of Arrangements, who also constitute the

Committee on Credentials, was called, and presented, through their chairman, their report, as follows:

REPORT OF THE EXECUTIVE COMMITTEE.

Your committee would respectfully report that they have made such arrangements for the sessions of this meeting as seemed to be required. Your committee recognizing the fact that heretofore there has been no systematic arrangement for the exhibition of instruments, appliances and specimens, and feeling the importance of such an arrangement, suggested to the President of this body the propriety of appointing a committee to take charge of such work for the time being at least. The President fully concurring in the suggestion, appointed the following persons as such committee, viz: Drs. H. R Smith, of Cincinnati; J. S. Knapp, of New Orleans, and I. A. Salmon, of Boston.

Your committee would suggest that, for the future, a committee be annually provided to perform the work indicated in these suggestions.

Your committee would present the daily order of exercise, viz:

Clinics—8 to 9 A. M.

Morning Session—9 to 12½.

Report of Committees—9 to 9½

Afternoon Session—2½ to 6.

Evening Session—8 to 10.

Your committee further report that they have received credentials of the following persons as delegates from the local Societies named:

Northern Ohio Dental Association—F. S. Whitslar, J. G. Templeton.

Cincinnati Dental Association—M. Rogers, T. F. Davenport, C. M. Wright.

Central Ohio Dental Association—S. D. Stewart, M. A. Spencer, E. Chidester, J. B. Beauman, William E. Dunn.

Missouri State Dental Association—G. V. Black, I. Comstock, G. W. Tindall, G. Beauman.

Lake Erie Dental Association—G. B. McDonald, W. E. Magill, D. C. Dunn, M. C. Clayain.

Ohio State Dental Association—F. H. Rehwinkle, W. G. Drake, W. M. Herriott.

Missouri Dental College—Homer Judd.

St. Louis Dental Association—A. D. Sloan.

Indiana State Dental Association—S.M Cummings, H. H. Morrison, E. M. Morrison, A. T. Keightley, E. Snider, S. M. Goode.

Chicago Dental Society—R. Gibson, J. S. Clapp.

Western Dental Society—A. W. French.

Mississippi Valley Dental Association—R. Corson, G. W. Field, D. R. Jennings, W. C. Stanley, H. Newington, Francis Peabody, J. P. Ulrey, B. F. Rosson, R. A. Mollyneaux, G. W. Keely.

Old Colony Dental Association—D. S. Dickerman, Jas. Utley.

Mad River Valley Dental Association—J. H. Paine.

Nashville Dental Association—J. C. Ross, S. J. Cobb.

Lebanon Valley Dental Association—W. K. Linneweaver.

Illinois State Dental Association—W. Allbaugh, J. M. Crouse, G. P. Kingsley.

Penn. Dental Association—William Smedley.

Ohio Dental College Association—W. H. Shadoan.

Tennessee Dental Association—G. W. Acree.

New Orleans Dental Association—J. R. Walker.

Central States Dental Association—H. M. Acree, S. P. Cutler, W. T. Arrington, J. A. Arrington, J. B. Wasson, R. Russell, F. W. Garkey.

Merrimac Valley Dental Association—W. H. Noyes.

Michigan Dental Association—E. S. Holmes, J. A. Harris.

Beaver Valley Dental Association—H. J. Chandler, A. M. Whisler.

Hudson Valley Dental Association—E. D. Fuller.

New York Odontological Society—A. L. Northrop.

Brooklyn Dental Association—S. C. Barnum.

Baltimore College of Dental Surgery—F. J. S. Gorgas.

Dental Association of the City of Newark, N. J.—C. S. Stockton.

All of which is respectfully submitted.

J. TAFT,
H. R. SMITH,
W. H. GODDARD. } *Ex. Com.*

The delegates now came forward, signed the Constitution and paid dues.

The minutes of the last annual meeting were now read.

A certificate of appointment as a delegate to this Association from the St. Louis Dental College, was presented by Dr. J. Payne, of St. Louis, the admissibility of which was called in question. When, upon motion of Dr. J. A. Kennicott, a committee of five was appointed to investigate and report upon the subject at as early a period as practicable.

Committee—J. A. Kennicott, A. W. French, J. Richardson, B. T. Spelman, R. W. Varney.

The President announced as the committee to present nominees for the various officers and standing committees, the following persons, viz:

H. R. Smith, H. E. Peebles, J. Richardson, T. L. Buckingham, J. C. Ross, J. F. Flagg, B. T. Spelman, D. S. Dickerman, A. W. French.

Adjourned to meet at 2½ P. M.

FIRST DAY—AFTERNOON SESSION.

Association met according to adjournment. The minutes of morning session were read and approved.

On motion, it was resolved to hold the evening session in the lecture room of the Ohio Dental College.

On motion of Dr. Watt,

Resolved, That the members of the medical profession of this city, and any who may be sojourning here, be invited to meet with this Association.

On motion of Dr. A. Lawrence,

Resolved, That this Association does hereby reconsider its action at our last session held in Boston, in regard to the Vulcanite Company, and totally ignore the whole subject.

The Committee on Nominations presented the following report, viz:

For President—H. J. McKellops, A. Lawrence.

For 1st Vice-President—P. G. C. Hunt, George T. Barker.

For 2d Vice-President—A. S. Talbert, A. B. Robbins.

Corresponding Secretary—C. R. Butler, W. T. Arrington.

Recording Secretary—J. Taft, J. A. Kennicott.

Treasurer—W. H. Goddard, James Taylor.

The election of officers being now in order, the President appointed Drs. C. W. Spalding and W. E. Magill as tellers.

A ballot being taken, the following persons were elected officers of the Association for the ensuing year: President, A. Lawrence, of Lowell, Mass.; First Vice-President, P. G. C. Hunt, of Indianapolis, Ind.; Second Vice-President, A. S. Talbert, of Lexington, Ky.; Corresponding Secretary, C. R. Butler, of Cleveland, O.; Recording Secretary, J. Taft, of Cincinnati, O ; Treasurer, W. H. Goddard, of Louisville, Ky.

The President appointed Drs. McKellops and Spalding to conduct the President-elect to the chair, upon taking which he made a short address eminently befitting the occasion.

The retiring President then delivered a very interesting and eloquent address.

The following invitation was now read before the Association:

"The members of the American Dental Association are respectfully invited to attend an entertainment to be given in this Hall, on Friday evening, August 2d, at 9 o'clock."

On motion of Dr. Watt,

Resolved, That the thanks of this Association are hereby tendered to the retiring officers, for the faithful manner in which they have performed their duties.

Adjourned to meet at the lecture room of the Ohio Dental College, at 8 o'clock, P. M.

FIRST DAY—EVENING SESSION.

The Association met according to adjournment. The President in the chair.

The minutes were read and approved.

The Committee on Pathology and Surgery was called, but were not ready to report, and were granted further time, and requested to prepare, in some form, points upon Dental Pathology as a basis for discussion.

The Committee on Operative Dentistry was called upon, when Dr. C. R. Butler, a member of the committee, reported that he had in his possession an unfinished report. He asked for time to complete the report, which was granted.

The Committee on Mechanical Dentistry was granted further time.

Committee on Dental Education was requested to report to-morrow morning.

The report of the Treasurer was called for and presented by Dr. L. D. Shepard, and is as follows, viz:

American Dental Association in account with W. W. Sheffield, Treasurer:

1866.		
August 3d—To cash paid to J. H. McQuillen for printing minutes,	$ 62	50
" " J. Taft for printing	7	50
" " L. D. Shepard to sundries	144	83
" " Reporters	210	00
" " 75 circulars and stationery	3	00
" " L. D. Shepard	610	44
	$1,038	27
1866.		
August—By cash of old Treasurer,	$ 212	27
" " 158 members, at $5 each	790	00
" " S. C. Wheeler, 1864	2	00
" " H. E. Peebles, 1866	2	00
" " George S. Allen, 1866	2	00
" " 6 absent members, at $2 each	12	00
" " W. R. Benezer, 1866-7	5	00
" " 3 members for 1866-7	13	00
	$1,038	27

W. W. SHEFFIELD, *Treasurer.*

New London, Conn., July 25th, 1867.

The chair appointed Drs. Chesebrough, Peebles and Kilbourne a committee to audit the Treasurer's report.

The Committee on Dental Literature was called, but had no report.

Committee on Prize Essays had no report.

Committee on Dental Physiology was granted further time, to report at a future session.

Committee on Dental Chemistry was called, to which Dr. A. Lawrence responded by reading the report of that committee, (for which see another page of this volume.)

Discussions on the report being now in order, the subject was taken up by Drs. Buckingham, Watt, Barker, Atkinson, Spalding, Fitch and Rogers.

The chair announced, for clinical operators to-morrow morning, Drs. I. A. Salmon, S. Driggs, W. T. Arrington, C. R. Butler, J. F. Flagg.

Adjourned to meet according to the regular order, to-morrow morning, at Hopkins' Hall.

SECOND DAY—MORNING SESSION.

Association met according to adjournment. Minutes were read and approved.

Considerable objection having been made to the Hall, on account of noise from the street rendering it difficult to hear and transact business, Dr. Taft remarked that the Executive Committee had secured Mozart Hall for the future sessions of this meeting.

Members of this Association were requested to place in the hands of the committee on Instruments and Appliances, all things for exhibition, at as early a period as possible.

On motion of Dr. Watt,

Resolved, That a committee of three be appointed to estimate the financial demands to be met by the Association for the current year, and report as early as possible.

Committee—M. S. Dean, I. J. Wetherbee, W. H. Morgan.

On motion of Dr. Taft, a committee of five was appointed to report upon the disposition of the transactions of this meeting.

Committee—John Allen, H. E. Peebles, H. S. Chase, W. H. Morgan, D. S. Dickerman.

On motion of Dr. Watt,

Resolved, That a committee of three on Therapeutics be designated by the Nominating Committee.

It was now moved to take up the proposed amendments to the Constitution.

The motion was made to adopt the first amendment proposed by Dr. B. T. Spelman, viz:

Insert between Sections 2 and 3 of Article III the following: "To be entitled to representation in this Association, Dental Societies shall be required to adopt or substantially recognize its Code of Ethics."

The subject was discussed by Drs. Flagg, Barker, Watt, Spelman, Bogue and Fitch, after which it was laid upon the table.

Dr. Watt renewed the notice for next year.

The committee on finance made the following report:

Your committee to whom was referred the subject of assessment, find the present liabilities of the Association to be $460.

To Drs. Lawrence and Taft	$260 00
To rent of Hall and contingent expenses	200 00
	$460 00

The additional assessment of $3 00 will give the Association the sum of $579, which, paying present expenses, will leave a balance in the Treasury of $110. This sum will be considered only reasonably sufficient to meet the contingent expenses for the present year.

All of which is respectfully submitted.

M. S. DEAN,
I. J. WETHERBEE, } *Committee.*
W. H. MORGAN.

After some discussion the report was laid on the table.

On motion,

Resolved, That the thanks of this Association are hereby tendered to Mr. L. C. Hopkins for the use of his Hall for this meeting, and for his very generous proposition in regard to the use of it.

Adjourned to meet at Mozart Hall, at 2½ P. M.

SECOND DAY—AFTERNOON SESSION.

The Association met according to adjournment.

The minutes of the morning session were read and approved.

The committee to report upon the disposition of the transactions of this body, presented the following report:

Your committee to whom was referred the subject of the disposal of the proceedings of this body, have consulted with the proprietors of the *Register* and *Cosmos*, and these gentlemen have generously offered to publish all the discussions and written papers presented to the Association at this session, free of charge, in their respective journals. And we therefore recommend that their offer be accepted, and that this Association publish no separate volume of proceedings this year.

JOHN ALLEN,
W. H. MORGAN,
H E. PEEBLES, } *Committee.*
H. S. CHASE,
D. S. DICKERMAN.

Some discussion was had upon the report, when it was recommitted without instruction.

The report of the committee on the credentials of the dele-

gate from the St. Louis Dental College was presented, read and unanimously adopted.

REPORT OF COMMITTEE ON THE CREDENTIALS OF DR. JOS. PAYNE.

Your committee would respectfully report, that they have had the matter referred to them carefully and earnestly under advisement, and weighing carefully all evidence, *pro* and *con*, they are forced to the conclusion that the St. Louis Dental College has no existence except under a technicality of a loose and dangerous statute of the State of Missouri; that it has never attempted to fulfill the spirit even of this bad law, by instituting lectures, clinics, or any other mode of teaching Dental science. That the degrees and diplomas which this so-called college has conferred, are null and void in law, and ought to be ignored and repudiated by all regularly constituted Colleges and Associations; that the scheme of its birth was conceived with very discreditable motives, and that its culminating act of sending a delegate to this Association, merits our strongest condemnation and rebuke.

And finally, your committee believes that the recognition of this so-called Dental College, by this Association, would be setting a dangerous and mischievous precedent, that would lower the standard of Dental education, and put quacks and mountebanks in the highest places of trust and honor in the profession. All of which is most respectfully submitted.

J. A. KENNICOTT,
A. W. FRENCH,
J. RICHARDSON, } *Committee.*
B. T. SPELMAN,
R. W. VARNEY.

Dr. Kennicott offered the following, which, after discussion, was adopted:

WHEREAS, It is a cherished object of this Association to elevate the standard of Dental education, and wipe out from the escutcheon of our noble profession the stains of quackery. Therefore,

Resolved, That we will not countenance any act of any Dental College that shortens the road to the honorable title of Doctor of Dental Surgery by lowering the standard of professional excellence.

Dr. Rehwinkel then moved to take from the table the amendment to the Constitution embodying a code of ethics.

After discussion, the motion was lost.

The committee to whom was referred back their report in reference to the publication of the Transactions, presented their revised report as follows:

Your committee to whom was committed their report on the disposal of the Proceedings and Transactions of this Association for this year, have had a proposition from Professor Taft to publish them on his own pecuniary responsibility, making the expenses of the publication from the sale of the work to the Profession. We therefore recommend that his liberal offer be accepted, and that he be furnished with all the papers of the Association for this purpose.

JOHN ALLEN,
H. E. PEEBLES,
W. H. MORGAN, } *Committee.*
H. S. CHASE,
D. S. DICKERMAN,

Dr. Spalding moved to take up the amendment to the Constitution increasing the annual dues of members from $2 to $5, which was agreed to, and the amendment adopted.

The order of the day was then announced, namely: the consideration of Dr. Lawrence's report on Dental Chemistry.

The discussion was participated in by Drs. Watt, Barker, Buckingham, Taft and others.

Dr. Atkinson made a report on Dental Pathology and Surgery. It was peculiar in its character, and excited considerable discussion, Drs. Judd, Spalding and Chase taking part in the same.

The following appointments were made for clinics to-morrow morning:

Drs. J. F. Flagg, J. A. McClelland, C. Palmer, S. C. Barnum, I. A. Salmon, C. H. Harroun, W. H. Shadoan, F. Peabody.

Adjourned to meet at 8 o'clock, P. M.

SECOND DAY—EVENING SESSION.

The Association convened at 8 o'clock. The President in the chair.

The consideration of Pathology and Surgery being now in order, it was discussed by Drs. Chase, Watt, Allport, Allen, Acree, Herriott, Taft, Kennicott and others.

The selection of the place for the next annual meeting was made the order for 10 A. M. to-morrow; immediately after which it shall be in order to hear a paper by Dr. John Allen.

Adjourned to meet at the regular hour to-morrow.

THIRD DAY—MORNING SESSION.

The Association met according to adjournment. The minutes were read and approved.

The report of the committee appointed at the last annual meeting of this body, with a view to present suggestions to the members of the profession upon the subject of receiving and training Dental students, presented their report, which was unanimously adopted:

Mr. President—The committee appointed under the provision of a resolution passed by this Association at Boston, on the 31st of July, ult., requiring said committee to draft suitable suggestions upon the subject of accepting students, with authority to circulate such suggestions among the members of the profession, have attended to the duty assigned, and respectfully submit the following report:

Your committee, acting under the impression that there were something rising seven thousand and five hundred Dental practitioners in the country at the time of our appointment, caused to be printed eight thousand circulars, and a corresponding number of endorsements thereof, in form as follows:

Dr.———, Dear Sir—The *American Dental Association*, at a meeting held in Boston, beginning July 31st, 1866, passed the following resolution:

"*Resolved*, 1st. That a committee of three be appointed to draft suitable suggestions upon the subject of accepting students, and that such suggestions be printed in circular form for the consideration of every Dental practitioner in the United States.

2d. That the expense of such printing and distribution be borne by the Association."

The undersigned, the committee appointed according to the provisions of the above resolution, are fully persuaded that the time has now arrived when every Dental practitioner in the country can and should lend his aid in elevating the status of the profession, to the end that those who are soon to fill our places may be prepared, in a greater degree, to fulfill the reasonable expectations of the public and hold Dentistry in its proper rank among the learned professions.

Our Dental Colleges have done much, and will doubtless do more, but there is a work for the private instructor to accomplish, that students may be better qualified to enter such collegiate institutions and graduate with credit to themselves and honor to the profession. It is not only essential that Dental Colleges exist, but they should be furnished with properly qualified pupils to ensure that success and usefulness contemplated in their foundation.

Relying, then, upon the generous co-operation of our professional brethren, we respectfully submit the following "suggestions" as a basis in "accepting Dental Students":

1st. He must possess a good moral character and at least a good English education.

2d. He must be required to apply himself diligently for three years, including two full courses of lectures in some Dental College, to the following studies, viz:

First Year—Anatomy, Histology and Physiology.

Second Year—Pathology, Chemistry, Metallurgy and Mechanical Dentistry.

Third Year—Operative Dentistry, Special Pathology, Dental Medicine and Microscopy.

We further suggest that the instructor examine his pupil in his studies at least twice every week, and as much oftener as may be convenient,—not, however, including his lecture terms,—and should the student, after sufficient trial, fail to exhibit the necessary talent for our specialty, he should be kindly apprised of the fact, and advised to seek other fields of usefulness.

Practitioners favoring the foregoing are respectfully requested

to date and sign the accompanying paper, and forward to the Committee.

A. LAWRENCE, Lowell, Mass.
C. P. FITCH, New York City.
J. TAFT, Cincinnati, Ohio.

January 10th, 1867.

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I endorse the suggestions of the Committee of the American Dental Association, on the subject of accepting Dental Students, issued January 10th, 1867. ——— *Dentist.*

Of these documents some seven thousand and six hundred of each were distributed by mail and otherwise, at an expense of $175 40, which added to the bill of $58 00 for printing makes a total of $233 40, vouchers for which are herewith presented. We have been much encouraged and gratified with the general and hearty responses received from all parts of the country; some 500 of the endorsements having been signed and returned, in many instances accompanied by letters bearing the most unmistakable approval of the measures recommended, from all which we feel satisfied that our labor has not been in vain, and that in the expressed sentiments of a large number of our coworkers, we have the assurance that the profession at large desire, and to a certain extent have pledged themselves to the furtherance and ultimate establishment of a higher standard of qualifications than has heretofore been considered requisite.

The assignment of specific studies during each year of pupilage will, it is thought, tend to produce greater uniformity and better results than could be expected without such an arrangement, and thus prepare the student to receive his lectures with more profit to himself, and not less honor to the profession, whose vital interests we aim to cherish.

A. LAWRENCE,
C. P. FITCH,
J. TAFT. } *Committee.*

The time for making choice of a place for the next annual meeting of this Association having arrived, that order was at once proceeded with.

A ballot being taken, the following places were voted for and are as follows:

Niagara, 48; Erie, Pa., 16; Pittsburgh, 2; Louisville, Ky., 12; Lookout Mountain, 13; Saratoga, 3; Mammoth Cave, 6; Newport, R. I., 2. A second ballot being had, Niagara received 54 votes, and was declared the unanimous choice.

Dr. John Allen now read a very interesting paper on the "*Physical History of various nations, with special reference to the Teeth.*" It was referred for publication.

Dr. J. F. Flagg now described and exhibited to the Association a preparation of gold for filling teeth, known as "Morgan's Plastic Gold." Also appropriate instruments for using it. At the conclusion of Dr. Flagg's remarks, on motion of Dr. H. A. Smith, it was

Resolved, That a committee of three be appointed to examine and test all specimens of Plastic Gold that may be presented, and report as early as convenient.

Committee—H. A. Smith, W. W. Allport, I. J. Wetherbee.

Adjourned till 2½ o'clock, P. M.

THIRD DAY—AFTERNOON SESSION.

The Association met according to adjournment.

On motion, it was made the order of the day, at 4 o'clock this P. M. to hear a paper read by Dr. S. P. Cutler.

The report of the Committee on Operative Dentistry was now read by Dr. C. R. Butler. It was referred for publication.

Dr. C. Palmer now read a paper upon wedging the teeth, which was also referred to the Publication Committee.

The order was now declared to be the reading of Dr. Cutler's paper on the Microscopy of the Teeth.

It was referred to the Publication Committee.

The subject of this paper was now taken up and discussed by Drs. Spalding and Atkinson. Pending the discussion, the Nominating Committee presented their report of nominees for the Standing Committees. After some consideration the report was re-committed.

On motion of Dr. French,

Resolved, That the Publication Committee is hereby authorized to use of the funds of the Association any sum not exceed-

ing one hundred dollars, for the employment of necessary assistance in compiling and proof-reading the Transactions.

Adjourned till 8 o'clock this P. M.

THIRD DAY—EVENING SESSION.

The Association met according to adjournment. The discussion upon the subject of Dr. Cutler's paper was now resumed by Drs. Judd, Taft, Chase, Atkinson, Barker, Spalding and Wetherbee.

The following persons were appointed to conduct Clinics to-morrow morning, viz: Drs. George L. Field, J. A. McClelland, S. C. Barnum, R. W. Varney, P. G. C. Hunt.

Adjourned to 9 A. M. to-morrow.

FOURTH DAY—MORNING SESSION.

The Association met according to adjournment. The minutes of the last two sessions were read and approved.

The report of the Committee on Instruments and Appliances was now presented and read by Dr. H. R. Smith, chairman of the committee, viz:

The Committee on Instruments and Appliances beg leave to report the following as having been placed in their hands for examination:

O. C. White, Head Rest; W. H. Eames, Duct Compressor, and Dental Record; A. W. Sprague, Gas Generator; Hull's Petroleum Gas Burner; Butler, Pluggers; Salmon's Dental Chair; Snow & Lewis, Automatic Plugger and Rack for Points; Salmon, Automatic Plugger, Rack and Points; Poor's, Taylor's, Palmer's, Redman's, Johnson's and Foote's Automatic Pluggers; Bannister's Pneumatic Mallet; James' Buckeye Vulcanizer; Lyon's Tooth Tablets; Miles' Gas Inhaler; Sprague's Gas Inhaler; S. S. White's Pluggers for Amalgam and Os-Artificiel, Saliva Pump, Excavators, Drills, &c.; Justi's Artificial Teeth; Manavin's Gold and Rubber Scales.

Your committee find all of the above articles worthy of high recommendation as valuable improvements, and would recom-

mend that the Association give the exhibitors an opportunity to present and explain the merits of their inventions.

Respectfully submitted.

H. R. SMITH, } *Committee.*
I. A. SALMON. }

On motion of Dr. French,

Resolved, That the Treasurer of this Association is hereby instructed to procure such books as he may deem necessary to correctly keep its accounts. Also to issue notices, and take such measures for the collection of dues as he may think best.

Dr. D. S. Dickerman, of Taunton, Mass., gave notice that at the next annual meeting he should propose the following amendments to the Constitution, viz:

In Article 3, Section 5, change so as to read,

To defray the expenses of printing the Transactions, and to meet other incidental expenses, the sum of five dollars shall be assessed annually upon all the members of the Association.

Any member neglecting to pay his assessment, for more than one year, shall not be deemed a member of this Association, or eligible for membership, until such assessment shall have been paid.

On motion of Dr. Spalding,

Resolved, That the Treasurer be instructed to furnish annually to the chairman of the Publication Committee, a list of all who have paid their annual dues, for his guidance in the distribution of the annual volume of Transactions.

The subject of Operative Dentistry was taken up and discussed by Drs. Atkinson, Wetherbee, Morgan, Shadoan, Kennicott, Spalding, Watt, Robbins, McClelland, McKellops and Taylor.

On motion,

Resolved, That Dr. S. C. Barnum be requested to illustrate his method of applying the rubber dam. Which he did.

Dr. French offered the following:

Resolved, That this Association hereby offers a prize of $5,000 which will be paid to any chemist or other experimenter who shall invent, for the use of the Dentist, a perfectly plastic material that shall be in every respect equal to gold as a filling for decayed teeth, and shall more nearly approximate the teeth in point of color. Said prize to be raised by assessment on the

members of this Association, and to be adjudged and awarded by a vote of the same.

After some discussion this was laid on the table.

Adjourned till 2½ o'clock, P. M.

FOURTH DAY—AFTERNOON SESSION.

The Association met according to adjournment. President in the chair.

Dr. E. A. Bogue offered the following:

Resolved, That it is the duty of each member of the Standing Committees to make an individual report, so far as such report can be made, and in case of inability to be present at the meeting where that report is due, to forward it to the Recording Secretary, from whom it can be obtained by the chairman of each committee, respectively, at the time of assembling of this Association. Adopted.

REPORT OF NOMINATING COMMITTEE.

The report of the Nominating Committee for Standing Committees, for next year, was made as follows:

Your Committee on Nominations beg leave to report the following Standing Committees:

Committee of Arrangements—George B. Snow, B. T. Whitney and A. P. Southwick, Buffalo, New York.

Committee on Dental Pathology and Surgery—W. H. Atkinson and C. P. Fitch, New York City; J. F. Flagg, Philadelphia; E. A. Bogue, New York City; E. H. Kilbourne, Aurora, Illinois.

Committee on Physiology—George T. Barker, Philadelphia; A. Hill, Norwalk, Connecticut; J. McManus, Hartford, Connecticut.

Committee on Dental Chemistry—H. S. Chase, Iowa; A. B. Robbins, Meadville, Pa.; I. J. Wetherbee, Boston, Massachusetts.

Committee on Dental Education—H. Judd, St. Louis, Missouri; G. W. Keely, Oxford, Ohio; D. S. Dickerman, Taunton, Massachusetts.

Committee on Dental Literature—M. S. Dean, Chicago, Illinois; S. B. Noble, Chicago, Illinois; J. A. Kennicott, Chicago, Illinois.

Committee on Dental Histology and Microscopy—S. P. Cutler,

Holly Springs, Mississippi; George S. Allan, Newburgh, New York; J. H. McQuillen, Philadelphia, Pennsylvania.

Committee on Operative Dentistry—J. C. Ross, Nashville, Tennessee; W. H. Morgan, Nashville, Tennessee; W. T. Arrington, Memphis, Tennessee.

Committee on Mechanical Dentistry—B. T. Spellman, Warren, Ohio; A. W. Maxwell, Galion, Ohio; C. H. Harroun, Toledo, Ohio; William C. Dunn, Delaware, Ohio; N. G. Lewis, Buffalo, New York.

Committee on Prize Essays—A. W. French, Springfield, Illinois; James Taylor, Cincinnati, Ohio; W. W. Allport, Chicago, Illinois; W. C. Horne, New York; A. S. Talbert, Lexington, Ky.

Committee on Voluntary Essays—P. G. C. Hunt, Indianapolis, Indiana; J. F. Johnston, Indianapolis, Indiana; Corydon Palmer, Warren, Ohio.

Committee on Dental Therapeutics—C. R. Butler, Cleveland, Ohio; W. O. Kulp, Muscatine, Iowa; A. P. Sayles, Lyons, Iowa.

Committee on Publication—J. Taft, A. Berry, H. A. Smith, Cincinnati, Ohio.

Your committee beg leave to submit the following resolution as a part of their report:

Resolved, That the Committee on Publication, of 1866, be and they are hereby requested to complete the work now in their hands at as early a period as practicable. Believing that the appointment of a special committee of three to receive and take care of articles presented for examination and exhibition at our annual meetings, would relieve the standing committee on Mechanical Dentistry of a part of their arduous duties—[see Section 6 Article 6]—we would respectfully recommend the appointment of such committee at this meeting, for the ensuing year.

All of which is respectfully submitted.

H. R. SMITH,
B. T. SPELLMAN,
J. F. FLAGG,
D. S. DICKERMAN,
A. W. FRENCH,
T. L. BUCKINGHAM,
JOS. RICHARDSON,
J. C. ROSS,
H. E. PEEBLES.
} *Nominating Committee.*

The report was adopted, and the chair appointed the following Special Committee on Instruments and Appliances for next year.

Drs. L. D. Shepard, E. A. Bogue and J. R. Walker.

Committee on Dental Education was called upon, when Prof. Spalding read a report on that subject, which was referred to the Publication Committee.

The report on Mechanical Dentistry was read by Dr. I. A. Salmon, which was also referred.

The subject of Mechanical Dentistry was taken up for discussion, when Drs. Herriott and Dunn each made some remarks illustrative, explanatory and commendatory of porcelain dentures.

Dr. Herriott also presented photographs of, and described, a case of replacement of a nose and superior lip, by an artificial appliance, which so well represented the natural parts as to escape detection except under a very close observation.

Dr. J. A. McClelland, of Louisville, exhibited some artificial dentures, the base of which was composed of an entirely new material, which, from appearance, would seem to subserve a very valuable purpose. The Dr. has not yet completed his investigations, and gave no intimation as to the material or method of working it.

Dr. Atkinson referred to a new material for constructing the base for artificial teeth, by J. F. G. Colburn, of Newark, N. J. in which there is much promise.

The subject of Mechanical Dentistry was further considered by Drs. Kennicott, Fitch, Wetherbee, Gibson, Barker and Allen.

The committee appointed to examine the relative qualities of the several preparations of plastic gold recently offered to the profession for filling teeth, would respectfully report,

That two specimens only have been submitted to them, viz: *Plastic Gold*, manufactured by D. Morgan, and *Crystalline Fibrous Gold*, manufactured by E. Lamm. These the committee have submitted to such tests, both in and out of the mouth, as the limited time granted would allow. They are of the opinion that with either of these preparations good fillings can be made if carefully manipulated.

They have not been able to accomplish these results, however, with the rapidity of operation that is claimed by one of the members.

In relation to the relative cohesive properties of the specimens, the committee found that the Lamm's Gold possessed this quality to the greatest degree; and for this reason they were able to introduce it rapidly into the cavity, and condense more rapidly than with the other preparation. Specimen fillings removed from the cavity, show an equal degree of density.

The committee believe both of these preparations will be found to be valuable materials for the purpose intended, and would recommend the members of the Association to test them thoroughly for themselves.

H. A. SMITH,
W. W. ALLPORT,
I. J. WETHERBEE. } *Committee.*

Dr. C. H. Harroun described his method of making artificial palates, going somewhat into minutiæ of the various steps of the process.

Dr. Bogue, also considered the same subject, approving very highly Dr. Harroun's method.

Dr. Shadoan described the method of constructing dental plates with gold and rubber combined, by which means he maintained that very efficient results can be secured.

The chair requested that all reports and papers be presented and read at the beginning of the session, to-morrow morning.

Adjourned until to-morrow morning at 9 o'clock.

FIFTH DAY—MORNING SESSION.

The Association met according to adjournment. The minutes were read and approved.

The Committee on Dental Physiology was called, when Dr. Spalding read a paper from Dr. J. S. Dodge, Jr., chairman of the committee.

Dr. H. S. Chase, also read a paper on Dental Physiology, and one on the Absorption of the Roots of Deciduous Teeth, all of which were referred to the publishing committee.

Dr. Atkinson presented and read the report of the committee on Microscopy, which had been prepared by Dr. R. W. Varney.

The Publication Committee of the past year presented the following report:

BOSTON, July 30th, 1867.

The Publication Committee regret that they have not been able to complete the publication of the Transactions in season for this meeting. Over 400 pages have been printed, embracing all of the report of 1865, and nearly all of the report of 1866; copies of which as far as printed, we present for use at this meeting.

To avoid the mistakes which have marred the transactions of previous years, most of them unavoidable under the system, we decided, in commencing the publication, to give each author a chance to correct his own proof sheets.

While this has ensured greater accuracy, it has caused more delay than we had anticipated. Some proofs were retained a long time by their authors and some were not returned at all.

There are other circumstances which caused loss of time, over some of which the committee had no control.

We decided not to reprint the transactions published previous to 1865, as there were still on hand a good number of them, and also, it would make too large a volume, and involve the Association in too great a debt.

We have printed an edition of 500 copies, which will leave on hand some over 200 extra copies.

We have received from the treasurer six-hundred and ten dollars and ninety-four cents ($610 94), which will nearly cover the whole cost of publication.

We submit this report with the hope that the Association will take such action as may be for its best interests.

Respectfully submitted,

L. D. SHEPARD, *Chairman.*

Dr. W. H. Atkinson gave notice that he would move the following amendments of the Constitution at the next Annual meeting, viz: the insertion of the words "except the Secretary" between the words "office" and "shall," in Section 1, Article 5, line 7.

Also, the addition of the following words to Section 5, Article 5, "and he shall be continued in office until removed by resignation, or impeachment for cause, and shall be ex-officio chairman of the Publication Committee, he shall receive yearly the sum of $200, as compensation for his services, to be paid out of the funds of the society."

The Committee on Investigation of Decay of the Teeth, was called upon, but had no report. The Committee was continued and requested if possible to report at the next Annual meeting.

Dr. J. A. McClelland was appointed to fill the vacancy that had occurred in the Committee by the death of Dr. J. L. Nourse, of Kentucky.

On motion of Dr. Watt,

Resolved, That a committee of two be appointed to frame suitable resolutions of respect for any members of this Association deceased within the last year. Committee, Drs. Watt and Spalding, who presented the following:

Your Committee in reference to obituary notices of members of this Association, respectfully report that, as far as informed, but one member has been removed by death since our last meeting. We allude to the lamented Dr. J. L. Nourse, of Cloverport, Ky. Dr. N. was at our last meeting in good health, and to all human appearances having a prospect of a long life of usefulness before him; but he sickened among strangers, and reached home only in time to die, another illustration that "in the midst of life we are in death."

Your Committee would offer the following resolutions:

Resolved, That in the death of Dr. Nourse, stricken down in the prime of life, in the midst of a successful and useful career—this Association and the Dental profession have sustained a serious and irreparable loss.

Resolved, That hoping and believing that our loss is his gain, we will cherish his memory, strive after his high professional attainments, and imitate his many virtues.

Resolved, That in lamenting our brother, removed by the hand of death, "who loves a shining mark," we will not forget to render thanks to Him in whose hands are the issues of life, that so many of us are yet spared to labor in the cause of afflicted humanity.

G. WATT,
C. W. SPALDING, } *Committee.*

It was on motion

Resolved, That the chair appoint a Special Committee of three to report on the subject of Neuralgia, and if possible have the report ready for the next Annual meeting.

Committee: Drs. J. A. Kennicott, Geo. H. Cushing, J. H. McQuillen.

Drs. C. S. Stockton and C. Sill, presented the following resolution, which was unanimously adopted by the members of the profession from abroad, who were present.

Resolved, That our thanks are due, and are hereby tendered to our brethren, the Dentists of the "Queen City of the West," for the very kind and hospitable manner in which they have received and entertained us.

The subject of Dental Physiology was now taken up and discussed by Drs. Judd, Atkinson, Spalding, Chase and Cutler, at the close of which, and after many spirited remarks, enthusiastic and stirring speeches, the Association adjourned to meet at Niagara Falls, at 10 o'clock A. M. on the last Tuesday of July, 1868.

ESSAYS.

THE PHYSICAL HISTORY OF VARIOUS NATIONS OF THE EARTH, WITH SPECIAL REFERENCE TO THEIR TEETH.

BY DR. J. ALLEN.

HAVING spent some thirty-eight years in Dental practice, I have often been asked these two questions: first, "are not the teeth of the people of this country worse than those of other nations of the world?" And, second, "what is the cause of so many bad teeth in America?" These are two important questions involving the welfare of some thirty millions of inhabitants. In order to answer them satisfactorily, we have found it necessary to examine the physical history of mankind, in order to compare nations with nations in reference to their teeth, taking into consideration their food, habits, customs, climate, etc., etc.

In prosecuting these researches we find there are many nations whose teeth remain sound, even to old age, and it is as rare for them to lose a tooth as it is an eye or a limb. While in this country it is estimated that there are more than twenty millions of teeth lost annually from decay. And yet we find that the same general physical law which provides for the building up and sustaining the human structure, prevails among all nations, and that the divine architect of man has furnished an abundant supply of materials for all parts of the system. The body of man, with all its different parts and organs, is composed of only a few simple materials. These are combined in certain proportions, in order to give strength and utility to the whole structure. These materials are component parts of his food; and although the nutrient substances used by the inhabitants of different parts of the world appear quite dissimilar,

yet the food provided for them in various countries possesses the same general nutrient properties and chemical constituents everywhere that are essential for the human organism.

We will now proceed to notice some of the historical evidences which go to establish the fact that the Americans, as a whole, have worse teeth than the inhabitants of other nations. In portions of Europe, where the people, like the Americans, discard a large portion of the mineral element from their food, they also have bad teeth; but among the Peasantry, and also in those sections where the inhabitants do not change the proportions of the mineral constituents of their food, they have good teeth.

But let us turn to the historical accounts of other countries where bolting cloths are not used for this purpose.

In Prichard's Researches into the Physical History of mankind he says: "the Albanians of Lesser Asia live principally on milk, cheese, eggs, olives and vegetables. Sometimes they bake bread, but often eat their corn or maize boiled." Hippocrates says they are very strong and muscular, have oval faces, a ruddy color in their cheeks, a brisk, animated eye, a well proportioned mouth, and *fine teeth.* In central Africa, north of the equator;—Prichard says "the Mandingo tribes have the barbarous custom so common among the Pagans of Africa, of filing their teeth to a point."

In eastern Africa, among the different races of Abyssinians, we have the following description by this eminent author: "Their countenance is full without being puffed, their eyes are beautiful, their mouth of moderate size, their lips thick, their *teeth white, regular, and scarcely projecting.*" Among the races of people inhabiting Nubia and other countries between Abyssinia and Egypt, Burckhardt says: "They are a handsome and bold people of a dark brown complexion, with beautiful eyes and *fine teeth.*" In the western parts of South Africa, comprising the Congo Empire, Proyart, who has graphically described it, says, "the negroes are well made, very black, with *white teeth* and pleasing countenances." In Dr. Oldfield's ethnographical researches in the interior of Africa, among the Felatahs, he says: "The color is light brown, features regu-

larly formed, handsome mouth, thin lips, *with teeth as white as ivory.*"

We will now pass into Asia, and there among the mountain tribes of Dekham in India, Dr. Maxwell says: "The Khonds are a dark race of men, straight, well limbed, and free from obesity, which makes them have a tall appearance. Many of the men have a pleasing expression of the countenance. Generally, however, the nose is flattish, the cheek bones high, the face round, the lips and mouth large, displaying *fine teeth.* The country produces rice, and most of the vegetables which are common in Europe." Among the Turkish tribes of Kiptschak, the Tartars of Kasan," says Erman, "are of middle stature and muscular, but not fat. Their heads are of an oval shape, their countenances of fresh complexion, and fine, regular features; their eyes, mostly black, are small and lively; their noses arched, and thin, as well as their lips; their hair is generally dark, and their *teeth strong and white.*" We will now pass to that part of Asia between Hindostan and China, where we find, according to Finlayson, that the Siamese blacken their teeth, and redden their mouths with a masticatory of lime, catechu and betel, which gives them a disgusting appearance. Baron Larrey, who is well known as an eminent author on physical subjects, says: "The inhabitants of Eastern Arabia are somewhat above the average stature, robust and well formed. Their countenances oval, and copper colored, the forehead broad and elevated, the eyebrows black and bushy, the eye dark, deep-seated and quick, the nose straight and of moderate size, the mouth well-shaped, *the teeth beautiful and white as ivory.*" "In Egypt," the same author says, "the surface of the jaws of the Arabs are of great extent and in a straight or perpendicular line. The alveolar arches are of moderate size, and supplied with *very white and regular teeth*, the canines especially, project but little." The Arabs eat little and seldom of animal food.

We will now pass to a group of islands situated in the great Southern Ocean, between the eastern coast of Africa and the western shores of the new or American Continent This group of islands received, from Captain Cook, the name of the Society Islands. Mr. Ellis, who spent some six years among the

inhabitants of Tahiti as a missionary, and had ample opportunity of observation, says: "These people are above the middle stature; in physical power they are inferior to the New Zealanders. The mouth of the Tahitian, he says, is well formed, though the lips are sometimes large, yet never so much so as to resemble those of the African. *The teeth are always entire*, except in extreme old age, and though rather large in some, they *are remarkably white, and seldom either discolored or decayed.*"

Mr. Anderson, who visited New Zealand with Captain Cook, says: "The nations do not exceed the common stature of Europeans, and in general are not so well made, especially about the limbs. Their color is of a different cast, varying from a pretty deep black to a yellowish or orange tinge, and their features are also various, some resembling Europeans. Their faces are round, with full lips, their eyes large, hair black, straight and strong. *Their teeth are commonly broad, white and well set.*" Another writer, Captain Fitzroy, in describing the people of New Zealand, where he speaks of their teeth, says: "They are like those of the Tucgians, and, at the first glance, remind one of those of a horse. Either they are all worn down, in old persons, canine, cutting teeth, and grinders, to an uniform hight, so that their interior texture is quite exposed, or they are of a peculiar structure," undoubtedly the former." The natives who live near the hot, sulphurous waters on the borders of the lake of the Roturna, have the enamel of their teeth, especially their front teeth, yellow, although this does not impair their soundness, and is the effect, probably, of the corroding qualities of the thermal waters. To the eastward of the Society Islands, in the South Pacific, are the Gambier Islands. They are inhabited by a people fairer than the Sandwich Islanders. The average hight of the men is about that of Englishmen, but they are not so robust. In their muscles their is a flabbiness, and in the old men a laxity of integument which allows their skin to hang in folds on different parts of their body. They have an Asiatic countenance, the teeth in the fourth class especially are not remarkable for evenness or whiteness, and seem to fall out at an early period. With reference

to these physical characteristics, Dr. Prichard says: "Two causes may be assigned: the nature of their food and their indolent habits."

We will now pass to Easter Island, which is situated perhaps the most remote from the great continents of all inhabited islands on the globe. Captain Beechey has given the following physical account of the inhabitants. He says: "They are a fine race of people, especially the women. They have oval countenances, regular features, a high and smooth forehead, black eyes and *fine teeth.*"

Next, let us take a view of the Sanwan group of islands, situated also in the Pacific ocean, in latitude thirteen and fourteen degrees. The inhabitants of these islands are strong, vigorous, and well proportioned. Their features are all referable to a common type. This type is thus minutely described: "The nose is short and wide at the base, the eyes are black, and often large and bright, the forehead narrow and high, the mouth large and well filled with *white and strong teeth.*" These islands abound in pigs, dogs, fowls, birds and fish, and likewise in cocoa nuts, guava, banian trees and sugar canes. Belonging to another group, in the same ocean, are the Tarawan Islands. The people of this group differ from those above described. They are of middle size, their color is dark copper, their hair is fine, black and glossy, the nose slightly aquiline, the mouth is large, with full lips and *sound teeth.*

Vanikoro, another group of these islands, is also in this great ocean. The sea coast is inhabited by a black race, who cultivate the taro, iguamas, bananas and the kava. "The inhabitants," says Dr. Urville, "belong to the black race of the great ocean approaching to that of proper negroes. They are generally small, their countenance has a singular resemblance to the ourang-outang, the eyes are large, and deeply set, resembling in form and color those of the negro. The lips are large, the chin small, the hair crisp. The use of the betel root destroys their teeth, and gives them a red tinge round the mouth. The women are horribly ugly, the old men are bald." Next we will proceed to the Archipelago, of the Fiji or Fejee Islands, which lie to the eastward of those above named, and

are situated between fifteen and nineteen degrees of south latitude. This is a large group of islands, many of which are inhabited. The largest of this group is called the Great Viti. The people of this island are called Vitians. They are tall, well made, active and muscular. Their faces are broad, nose large and flat, large mouths, thick lips, and *sound, white teeth.*

The Fejeeans are generally above the middle hight, and exhibit a great variety of figure. Their complexion is between that of the black and copper colored races, although instances of both extremes are to be met with, thus indicating a descent from two different stocks. The faces of the greater number of the Fejeeans are long, with large mouth, *good and well set teeth.*

Leaving the Fejee Islands, we will pass to the coast of Australia. Captain Wilks, who was sent out by the government of the United States on an exploring expedition, says: "The natives of Australia differ from any other race of men in features, complexion, habits and language. Their color and features assimilate them to the African type, their long and black silky hair has a resemblance to the Malays; in their language they approximate more nearly to our American Indians, while there is much in their physical traits, manners and customs to which no analogy can be traced in any other people. Their color usually approaches chocolate, a deep umber, or reddish black, varying much in shade in different individuals. The cast of the face is between the African and Malay, the forehead usually high and narrow, the eyes small, black and deep set, the nose much depressed at the upper parts, the cheek bones are high, the mouth large and furnished with *strong, well set teeth.*"

We will next direct your attention to the American races or tribes of this continent. Dr. Morton, who has published a very popular work on American skulls, says: "It is an old saying among travelers, that he who has seen one tribe of Indians, has seen all. So much do the individuals of this race resemble each other that notwithstanding their immense geographical distribution, and those differences of climate which embrace the extremes of heat and cold, there is a remarkable identity of physical characteristics throughout this whole race of people.

All possess, alike, the long, lank, black hair, the brown or cinnamon colored skin, the heavy brow, the dull and sleepy eye, the full and compressed lips, and the salient but dilated nose."

Without following this author through his details of the physical characteristics of the American races, we will pass at once to his records of their teeth. He says: "The cheek bones are large and prominent, the upper jaw is often elongated, but the teeth are, for the most part vertical. The lower jaw is large and ponderous; *the teeth are also very large and seldom decay*, and few present marks of disease, though often worn by the mastication of hard substances."

With reference to the nations of the western coast of North America, we have the following record from Captain Cook and Mr. Anderson:

"The visage of most of them is rather round and full, and sometimes also broad, with high, prominent cheeks. The nose flattened at the base, the forehead is rather low, the eyes small, black and languishing rather than sparkling, the mouth round, with thickish lips, *the teeth well set* but not remarkably white."

We will now direct attention to the nations of Chili, of California, and to those of the country near the Baie des Francais, who are of the Kolushian race. In the historical account of these people, by Mr. Rollin, we have the following: "They have rather a low forehead, black and lively eyes, nose of a regular shape and size, rather wide at the extremity; lips fleshy, a mouth of middle size, *fine and well set teeth.*" We will also notice the Peruvian nations. The physical characteristics of these nations in general are described by Dr. Orbigny. He says: "Their features have an entirely peculiar cast, which resembles no other American people but the Mexicans. Their head is oblong from the forehead to the occiput, somewhat compressed at the sides. The forehead is slightly arched, short, and falling a little back. Their face is generally broad, approaching to an oval form; their nose prominent, long, and strongly aquiline; the mouth is larger than common, though the lips are not very thick. The teeth are *always beautiful, even in old age.*" Dr. Orbigny says the mountaineers in South America are generally short, while the inhabitants of the plains

are tall. "The Aroucans are a square, stout set of men with robust limbs, but without obesity; their joints large, their hands and feet small. Their heads are large in proportion to their body; the countenance full, round, with prominent cheek bones, large mouths, but thin lips. *Their teeth are good, and remain sound in old age.*"

"The aboriginal nations of Eastern Patagonia," says Captain Fitzroy, "are a tall and extremely stout race of men. Their color is a rich, reddish brown. The head of the Patagonian is rather broad, but not high; the mouth is large and coarsely formed, with thick lips. Their teeth are usually *very good*, though rather large, and those in front have the peculiarity of being flattened, solid, and showing an inner substance." The following is an extract containing a description of the Pesherais, a people who inhabit one of the islands of the Magellanic Archipelago. (This extract is taken from an account of an exploring expedition sent out by the United States government.)

"These people are not more than five feet high, of a light copper color. They have short faces, narrow foreheads, and high cheek bones. Their eyes are small and unusually black. Their nose is broad and flat, with wide-spread nostrils, mouth large, *teeth white, large and regular.*" Dr. Orbigny in describing another tribe of the South American Indians, (called the Botocudos) says: "They wear for ornaments, collars or strings of human teeth." This is an evidence of their soundness and beauty. In the northern division of South America we have the following physical description of a people called the Chaymas. Humboldt has given the following description of them:

"The countenances of the Chaymas, without being hard and stern, has something sedate and gloomy. The forehead is small and but slightly prominent. The eyes black, sunken, and very long. The wide mouth, with lips but little prominent, has often an expression of good nature. The nose and nostrils resemble those of the Caucasian race." "The Chaymas," says Humboldt, "have fine, white teeth, like all people who lead a very simple life."

Having taken a cursory view of the physical characteristics

of several other nations of the world, with special reference to their teeth, we will now return to our own country. We have here a mixed population from various parts of the world, who have become so assimilated in habits, manners, customs, mode of living, etc., that the historian would recognize the same general physical characteristics of the people throughout the United States. But how different would be his record in reference to the teeth of the Americans at the present time from those nations herein refered to. He would tell you that very many of the people of this country have narrow, contracted jaws, with crowded and badly decayed teeth. And in his statistics he would announce to you the startling fact that twenty millions of teeth are annually lost by the people of this country. From the evidences which we have endeavored to bring before you, it will be seen that the teeth of the people of this country are far worse than of any other here described. Mark the words of Humboldt when he said: "The Chaymas have fine teeth, like all people who lead a very simple life." It will be observed that in these historical researches, there is no evidence that the nations Humboldt alluded to attempted to improve their food by changing the proportions of the different constituents which the Creator has duly apportioned for the building up of organized beings. But, on the contrary, those nations use their food in the most simple forms, with all the constituents which nature placed there for the use of man. Another important fact in the history of those nations who have well developed jaws and teeth, should be also noted. It is this: they have plenty of exercise in the open air, which enables them to appropriate the different constituents in their food to the various parts and organs of the human system. From these different nations, therefore, we may learn some valuable lessons on the subject of the teeth. Although they have no Dentists nor Dental literature, (for they need none) yet they learn much, as we may, from Nature, which will be found to tally exactly with true science.

Now let us turn again to our own records and see how widely we have departed from some of those physical laws which have been established by Omnipotence for our well-being. We have

vainly attempted to improve our bread (the staff of life) by changing the proportions of the mineral element in the flour we use, by bolting the most of it out and discarding it. Look for a moment at the gigantic scale upon which it is done in this country. According to our national statistics of 1860, there were in the United States 13,868 milling establishments for the manufacture of flour and meal, requiring 27,626 men, at an annual cost for labor of 8,721,391 dollars. Thus, you see, the number of men, mills, bolting cloths and dollars that are employed in this great *improvement* (?) devised by man for changing the proportions of one of the most important constituents in the staple article of food in this country. The result of ignoring this mineral element from the staff of life is, undoubtedly, to a great extent one of the most prominent causes of this national calamity, that sweeps from the population more than 20,000,000 of teeth every year. The potter cannot make the bowl without the clay, neither can good teeth be formed without a due proportion of lime, which is abundantly provided for our use upon the outer portion of the grain, and in rejecting this portion of the cereals we virtually refuse to use the requisite materials of which the teeth are formed. We also deprive ourselves of a due proportion of atmospheric constituents, especially in our crowded cities. And also of the requisite amount of exercise to promote vigorous health and good constitutions. If we would be instrumental in doing more good in our profession, let us do all in our power to diffuse these important truths among the people.

PHYSIOLOGY.

HOW ARE DECIDUOUS TEETH CAST OFF?

It is by a physiological process as simple and beautiful as that by which their growth, dentification and calcification take place.

It is admitted by all that *absorption* takes place. Whether this process is excited by impingement of the crown of the

tooth of replacement on the roots of the temporary teeth or not, is a disputed question.

My own opinion was expressed on a former occasion, in the following words, namely: "Absorption of the roots of temporary teeth takes place in the ratio of the advancement of the permanent teeth, in the process of eruption, independently of their topographical relations."

ABSORPTION is a vital process and cannot take place in a dead bone, or tooth. Those who deny vital action in calcified dentine, will have hard work to prove that absorption does take place. A dead bone or a dead tooth has no more physiological relations to living tissues than has iron or wood.

Physiological processes can take place only in living tissues.

Absorption is a word of ambiguous meaning, in its histological sense, in reference to the removal of the roots of teeth. At least the majority of men seem to have no definite idea of the manner in which it takes place.

Absorption of the nutrient elements by the intestinal villi, is a mere reception of those elements into the pores or open mouths of the columnar epithelium of those villi. Absorption of water by the skin is an endosmosis, an active osmotic action in the cell walls or membranes of the skin.

ABSORPTION OF DENTAL TISSUES in deciduous teeth is a *retrograde* physiological process.

It is a work done neither by the dental blood vessels, the gum, a "carneous body," or by any other tissue or organ; but it is a work performed by the tooth itself.

Modern discoveries in physiology have demonstrated that all the active processes of life take place in the *ultimate* anatomical organs, which are *cells*. I shall assume that the reader is acquainted with cellular physiology, for without this knowledge an intelligent understanding of the beautiful and delicate process of growth, disintegration and decay must ever remain to him an unknown world.

THE PROCESS OF ABSORPTION.

The first thing which we observe on the extraction of a milk

incisor in which this work has commenced, is a shortening of the root. The calcareous matter is gone, and so are the distinctive dentinal and cemental tissues. There are neither dentine tubes or bone corpuscles left in the bottom of the alveolus; but in their place a mass composed mostly of histological connective tissue. The peri-cementum or alveolar dental periosteum is the first to change itself, and also to initiate change in the osteoid root itself.

The process commences near the *end* of the root, although it sometimes does higher up on its lateral surface. The Dental artery which supplies the root remains intact after considerable progress has been made in the work of metamorphosis. The arterial radicals of the peri-cementum enlarge, they carry a greater amount of blood than before; especially is this the case when the Dental artery has been destroyed by impingement of the crown of the tooth of replacement against it. These arterial radicals lengthen also as the process of metamorphosis goes on, so that the vessels are always near the scene of action to carry food for the work, and also to remove effete materials.

Simultaneously with this work going on in the root, a change takes place in the Dental pulp; the cavity in which it is situated enlarges in every direction, and particularly towards the distal portion of the crown, so that the horns of the pulp reach nearer the grinding surface of the crown than before. As this process proceeds, the pulp itself grows larger in corresponding directions, and keeps even pace with the enlargement of the cavity, so that its cells are always in contact and union with the unmetamorphosed portion.

As the root is more and more removed, the space which it occupied is filled more or less with bone which has been differentiated from connective tissue. The bottom cells are changed to bone corpuscles, and ossification proceeds in a ratio corresponding to the change of dentinal tissue into connective tissue cells.

When the process is ended in the entire loosening of the crown, so that it falls out with a slight touch, we see that the connective tissue of the alveolus is continuous with that of the gum, and to the naked eye the highly vascular mass of cells

upon which the crown rested looks like the gum deprived of its epithelium. On a close examination it looks like the healthy granulation of an ulcer or wound.

If the process has extended to completion, we find on examination of the crown that most of the dentine and considerable of the enamel has been absorbed or metamorphosed.

A tooth before me shows this change in the enamel on the anterior gingival border, which process is carried to a much greater extent on its lateral surfaces.

HISTOLOGICAL CHANGES.

The bone corpuscles of the cementum change their shape and become connective tissue cells, the latter proliferate, so that all the space is occupied with cells. The dentine tubes, also, are gradually changed into the same kind of cells as those of which they were composed before dentine tubes were formed, namely: connective tissue cells. The same changes take place within the pulp cavity, the metamorphosis commencing next to the pulp, and the latter grows in size by a transformation of dentine tubes into connective tissue cells, of which the pulp is composed, and from which the dentine tubes were orginally differentiated. At the bottom and sides of the alveolus, the cells of connective tissue are gradually changed to bone corpuscles, and then the intercellular space is filled with calcareous matter, and true bone is formed.

It is difficult to decide whether the walls of the Dental tubuli and cementum corpuscles liquify and pass by osmotic action into the connective tissue cells with which they are in contact, or whether, on the other hand, the differentiation of cells really takes place.

The cell multiplication which takes place in the peri-cementum and pulp, looks like the former, and yet the latter would seem the more natural process. It is quite probable that both processes exist in the changes which occur. It is not likely that the nuclei of the cells forming dentine are destroyed when the tubular structure takes the place of the cellular. In other tissues we find the nucleus thrust aside against the cell wall

when some particular function is to be performed and cell multiplication has ceased. This takes place in bone, articular cartilage, the nails, etc., etc. The application of some chemical agent, sometimes an acid and sometimes an alkali, will generally bring the nuclei to view under the microscope.

I have spoken of the changes which occur, just as though no tooth of replacement occupied the alveolus of the milk tooth, as its root is being removed. This was to simplify the process. This sometimes happens in fact, although almost universally the tooth of replacement follows closely on to the metamorphosis of the root. All space, however, not occupied by either tooth, is filled with bone or else transitional tissue.

I have said that cellular activity is going on *within* the tooth, at the same time as it progresses without. We sometimes observe that the former process outstrips the latter, and then the crown frequently falls off, leaving the roots in their alveoli unabsorbed, although this does not hinder their removal by cell action, for it still goes on until the smallest particle of root is removed.

How happens it then that portions of milk roots are often left in the gums without absorption? It is because they are necrosed, dead. We know that frequently the whole tooth is necrosed from decay and suppuration. In this case no portion of it is absorbed, but the whole is thrown off from the system as a foreign body, either in mass or by chemical disintegration. What happens when the pulps have been destroyed and removed from milk teeth, and the cavities plugged? Absorption then takes place in the roots alone, and the crown is consequently retained longer in the jaw than when the pulp is left to act its part also.

MICROSCOPY OF THE TEETH.

BY S. P. CUTLER, M. D., D. D. S., HOLLY SPRINGS, MISS.

I HAVE said that in extracting nerve pulp from a tooth, that the nerve fibrils are broken off close to the inner wall of the pulp cavity. Suppose these fibrils were not quite as large

as the tubuli, that they did not quite fill the tubuli, and that they even did not bind or fasten themselves in the inter-enamel membrane in any way, and that they possessed considerable strength, they then could not be withdrawn, from this cause, namely: the tubuli are not all the way between one bifurcation and the next, even in size, but are expanded and contracted alternately during their whole extent, or in other words there is a regular succession of bulbs or beads, which would sufficiently bind the fibril to prevent its leaving the tube.

This beaded or baccated appearance is more strongly marked in some sections than in others, and in different teeth there is a noticeable difference, though never entirely absent in any. Some have, and I believe do at the present time, entertain the idea that the tubuli do not contain any nerve filament at all, but instead, a nerve fluid capable of being put into vibrations, and these vibrations imparting sentient impressions to the pulp itself, similar to the impressions received by the drum of the ear from atmospheric waves. Any such notions are, to my mind, exceedingly erroneous, and cannot be sustained by facts. It is a well established fact in physiology, that where there are no nerve filaments there can be no pain, from any cause, produced, and that all accute pain is received by minute nerve filaments, and the more minute or attenuated the nerve, the more acute and lancinating the pain. I come now to speak of the pulp proper. The pulp is generally regarded as a nerve simply enveloped in a membrane together with artery and veins. I have specimens prepared showing distinctly that the pulp proper is made up of the ingathering of all the nerve filaments that occupy the tubuli, passing down through the membranes from all sides of the nerve cavity towards the apex of the fang. This pulp contains a great many thousands of nerve fibres, all converging as they pass down, coming in close proximity after entering the pulp membrane. Now let us reverse the nerve, or commence at the apicial extremity and pass up the fang in our description.

This insignificant nerve, as I have before stated, after entering the foramen dentium, undergoes or becomes a system of bifurcations, sending off branches, as before stated, every five

thousandth of an inch on all sides throughout the entire interior of the pulp cavity; hence this small nerve multiplies itself into many thousands of nerves by a system of branching or bifurcations sufficient to ramify throughout the entire tooth, continuing to branch after entering the dentine, as has been heretofore described. This pulp might be with propriety denominated fasciculi dentinalis.

These filaments contained in the pulp continue about the same size on to the first fork after entering the dentine. This pulp does not fill the pulp cavity entirely full, there being a small but perceptible space between the piamatal membrane and the duramata dentalis, which can be readily seen after opening the nerve cavity, when the pulp envelope is not wounded, with an ordinary magnifyer and with a microscope, viewed as an opake object the nerves can be distinctly seen passing through the pulp membrane into the dentine. I shall speak of this space more elaborately further on.

The nerve or nerves contained within the pulp cavity is a multiform arrangement or system occupying the centre of the pulp membrane throughout, sending off branches on all sides from the central stem obliquely though irregularly outwards and upwards from the apex throughout until near the pulp membrane where they turn nearly at right angles as they pass through this membrane into the dentine. The direction through the latter has been minutely described.

This nerve, in its filamental arrangement through the interior of the pulp, does not observe the same regularity as through the dentine. On the contrary there is great irregularity. At some points they are very tortuous, full of irregular crooks, observing no regular order only in the central region. Their directions are outwards, but observe no regularity until near the membrane, where their distances apart become nearly equal.

In some regions the nerve branches are crowded or huddled together, in other regions they are wide apart and scattering.

There is a great difference in size. Some branches are twice as large as others. The above irregularities are more conspicuous in ossified pulps.

Some of these nerves have numerous fine lateral short

branches terminating in delicate points, presenting a feathery appearance. Some branches are formed at their origin of numerous fine branches, soon uniting to form a single branch. These branches throughout the pulp are in inverse order to those of the dentine, in this respect resembling the roots and branches of a tree, the roots being situated in the pulp. Some of the pulp branches are larger than any of the dentinal branches, though the larger portion are smaller until near the membrane, where they are all nearly of a size, resulting from the ingathering of minute roots making up the branches. Some of the larger ones fork just before reaching the membrane, but not frequently. The beaded appearance is observed in the pulp branches as in the dentinal. The central stem resembles a horse's tail (cauda equina) more than any thing else. This conduited structure might be considered as one great plexus containing more nerve branches than any nerve in the whole system, their numbers are legions. Genuine ganglia do not exist in this central stem, though there are knots of filaments resembling gangliæ. Besides this great central plexus, there are numerous small plexus arrangements between the stem and membrane, which might be denominated minor or secondary plexuses, where membranous filaments have their origin. These plexuses are all connected with the central system not isolated. To recapitulate. The central system, observe considerable regularity. Between this and the dentine, great irregularity. Again, near the membrane, regularity as to size and distances apart predominate. In short, no description by myself can convey an adequate idea of the actual microscopic appearances of this system of complex nerves. It is a complete system of complications within itself, having no analogue in the organism, and when fired up by inflammation is like a legion of infuriated demons, cutting and slashing through the whole body without mercy, which any one having suffered from tooth ache can fully testify to.

There is, besides the nerves, an extensive cellular structure occupying the inter-filamental spaces. These cells are filled with colorless globules not half the size of those of blood, together with albumen, soluble fibrin, cerum and bone salts,

constituting all the elements of dentinal nutrition. There is entering the pulp at least one artery and two veins at the apex. These vessels ramify and multiply extensively throughout the pulp.

To be continued.

MICROSCOPY OF THE TOOTH.

BY S. P. CUTLER, M. D., D. D. S., HOLLY SPRINGS, MISS.

I SHALL premise this article by adverting to the inter-globular spaces. In the first place there are no such spaces to be found in sound dentine. The appearances that have given rise to such suppositions are delusive, they are in all cases defects in the mounting, so far as my own observations are concerned. By applying heat from a spirit lamp these spaces may be caused to assume varied shapes, and even disappear altogether. Here I shall leave the subject.

The blood vessels in the pulp ramify extensively through and among the nerves, furnishing nutrition to the entire tooth, as all nutrition ceases when that nerve is destroyed. These blood vessels anastomose extensively with each other, and contain red and colorless globulin, together with all the other constituents of blood.

There are capillaries that do not carry red blood passing through the pulp membrane stopping there with open (not proven) mouths, which furnish a nutritive fluid to the spaces between the two membranes, consisting of albumen, cerum, colorless disks and the earthy salts. In a state of health no red blood is found in these spaces, only in cases of inflammation, when the capillaries become sufficiently large to let red globules through. On opening a nerve cavity containing a normal nerve, there will be found a limpid fluid only. This fluid furnishes all the nutritive materials for the tubuli, which is taken in by osmotic action, there being sufficient space for that purpose surrounding each nerve filament. These filaments have a thin covering or neurilemma, this however is not demonstrated, only it is in accordance with the nervous system in

general. This covering must be sufficiently porous for purposes of absorbing nutrition and giving off effete matter. So, also, with the inter-tubular walls. This absorption or osmotic action is conveyed through the tubuli to the enamel or the inter-enamel membrane and to the crusta petrosa and through the latter to the outer surface, or near the peri-cemental membrane, where it meets the nutrition from that membrane, (this simply a hypothesis though tenable.)

Ossification of the nerve has been spoken of, but not fully described. This process will be noticed under two distinct heads: first, from wearing away, or down, of the crown until within a certain distance of the cavity, this distance varying in different cases. As the crown is worn away, the prominences are the first worn, generally before all the enamel is worn away from the crown, the process of ossification begins first under the points most worn, which is the corner or horn corresponding to the cusp, then extending across under the wearing surface. When the wearing ceases from any cause the ossifying ceases until the wearing process is resumed. When this process is not too rapid there is no uneasiness felt, but when too rapid the tooth becomes quick or tender on the wearing surface, preventing the person from chewing without pain or uneasiness.

The remedy is simple and efficient: that is, rest for a few days. When this wearing process is too rapid, loss or death of nerve is invariably the result. This process of sitting may go on through the entire pulp canal, if not too much hurried. This process is carried on by deposit of soluble bone material between the two membranes, caused by an increased flow of blood to the tooth; resulting from the irritation caused by the wearing and wounding of tubuli. At first this bony deposit is in a fluid state, but soon becomes hardened by absorption around the nerve filaments. This process may commence between the dentine and the dura mater dentalis, forcing that membrane downwards, causing the pulp to absorb at that point. This point is not settled or fully determined, and needs further investigation. As the nerve ossifies the filaments are surrounded by soluble dentine or, as one writer calls it, secondary dentine, and very appropriately too. When a tooth is extracted that has under-

gone this process in a normal manner, it does not shrink from the original dentine, if at all only on one side, owing no doubt to shrinkage. When the tooth is examined soon after extracting, there is no appearance of shrinkage; this only takes place after some days This substance has about the appearance, to the naked eye, of cementum. This process or formation might be, with propriety, denominated exodentosis internas, and would come under a mixed head, both of physiology and pathology, or either. It is both normal and abnormal; it is, to say the least, an accidental occurrence, not belonging to the original type of the tooth. There is a condition of ossified pulp depending on a totally different cause, that is from exposed pulp, causing slight but continued and protracted grumbling or tooth ache, and when not too sudden, in certain temperaments, results in ossification of the entire pulp in some cases, in others only partial. The pain or irritation causes an excess of earthy salts to be carried to the pulp, or at all events to be retained there sufficient to ossify the pulp more or less throughout. In some instances circumscribed points only are ossified, sometimes in fang only.

The ossified pulp under consideration has no adhesions to the dentine, only occupying the exact space of the normal pulp, there being a perceptible space between this and the dentine, which may be distinctly seen with the natural eye or a low magnifier. This form of abnormal nerve shows the filamental system more perfectly than any other prepared for the microscope. Sometimes the petrifying process, if I may be allowed the expression, commences most actively immediately under the seat of decay. This is, no doubt, frequently the cause why we are not able to stop toothache by applications of arsenic, the nerve having but little vitality and so much hardened as to prevent any absorption of the arsenic, and if absorbed, could only take place outside of the pulp. I have noticed the normal amount of fluid outside of the pulp frequently after extraction. There is generally some sensibility on introducing an excavator or on pressure. This comes under the head of pathology and is not a natural or saving provision in nature, though sometimes the tooth is saved from this cause, where it

otherwise might have been lost. In such cases the Dentist would have rather a difficult task before him to extract such a nerve. Similar processes may occur sometimes under the filling of a tooth where there has been much sensibility. I have a tooth of that sort in my possession where a pure silver amalgam plug had been in some seven or eight years, the tooth having grumbled about seven months before extraction. The query is, at what time did ossification take place in this instance? It was a large cavity, and the plug, tooth and pulp were all dark colored, nearly black.

REPORT OF COMMITTEE ON DENTAL EDUCATION.

The Committee charged with the subject of Dental education, take much pleasure in reporting that gratifying evidences exist of increased prosperity in the educational department of our profession.

During the year that has passed a new college has been organized in the city of St. Louis, which increases the number of schools to six now in operation in this country. An organization designed to include the faculties of the colleges has also been perfected, having in view greater uniformity in the rules and usages of the different schools, and concert of action among them for the general advancement of Dental education.

Your Committee regard these as encouraging manifestations of the earnest spirit which prevails among those who are immediately engaged in the work of education—a work in their opinion highly essential to the vital interests of the profession, and one which should engage its most profound attention.

There is no subject of greater importance, Mr. President, nor one which lies nearer to the question of substantial improvement than the one which we are now considering.

It constitutes the ground work and basis of subsequent acquirement, and is the distinguishing characteristics of the professional man. Without it, our claim to rank among liberal professions would fail of a practical acknowledgment, for we shall ever be assigned a position in the scale precisely agreeing

with the measure of our cultivation. This is all we have a right either to ask for or to expect, and is the result of the legitimate operation of the law of cause and effect. Even our relative standing among ourselves, is graduated to a large extent by the scale of educational attainments. He, therefore, who would stand high among his fellows must *deserve*, and thus command respect, by a dilligent study of the truths of Dental science. He who neglects to do this, or omits to add to the sum of his qualifications all knowledge which lies within his reach that would help him to a better or more intelligent performance of his professional duties, will not only fail to reach the standing to which he aspires, but he is also untrue to himself, and unfaithful to his patrons. If knowledge is power, conversely ignorance is weakness. Indeed, in this enlightened age we might almost call it a crime. It is certainly a power that cannot be wielded until it is possessed.

If then, the subject of Dental education is of such paramount importance, is it not one of the first duties of this Association to widen its sphere and enlarge and improve the facilities for its acquirement until it is placed within the reach of every one who contemplates entering our ranks ?

We should then be prepared to solve another problem, and to take that other step which has been the subject of so much serious thought, not to say solicitation, viz: that of requiring every candidate to become the just recipient of the title of D.D.S. before he can be admitted to the roll of membership in any society, general or local. We must come to this point sooner or later, and in the opinion of your Committee, the sooner the better for the interests of all concerned. It seems to us that some action looking to this end has become a pressing necessity. At present we have no fixed professional standard by which a man is to be measured—no rule which any one is required to comply with before he is to be recognized as a Dentist. Lacking any such law unto ourselves, we cannot expect the public to supply the omission, and therefore, *any* one and *every* one who chooses may hang out his sign, and set up his claim, not only to *be* a Dentist, but also to be recognized as such by others. And if, perchance, some one more courageous than the rest

should presume to question his right to be so considered, or should refuse to acknowledge him as a professional equal, he is at once assailed and denounced by the whole army of fledglings who are as newly and cheaply made as himself.

Woe be to the man who has the courage to withstand this inflowing tide of ignorance and pretension!

As a profession, we must meet this question, and deal with it fairly, carefully avoiding injustice toward any one; but at the same time, asserting and maintaining the right, and devising some plan which shall guard the interests of the profession and ensure its future exemption from the evil complained of.

Some are asking for protection from State authorities. This is all very well, but is it not our first duty to throw around ourselves the protection which is within our own reach and is wholly under our own control? Having done this we should present a clean record in asking for legislative enactments for the protection of the public.

The wide-spread efforts which have of late been made for the establishment of some uniform rule for our guidance, shows that the evil is sufficiently extensive to justify its introduction before this general body.

Let us now turn our attention for a moment to the specific meaning of the term "Dental education" and see what it implies. The term *necessarily* includes only so much of literary knowledge as will enable one to speak and write gramatically, and to pursue understandingly the study of the sciences. More than this is indeed desirable, and may be very usefully employed, but is not regarded as absolutely necessary to Dental education. So also of the sciences; the wider the range of previous study, and the deeper the investigation of the general laws of nature, the more readily will the student master the particular studies which belong to our special system of education, and other things being equal, the higher will be his standing as a student and subsequently as a practitioner.

These are important accomplishments which wonderfully adorn the professional mind, only so much, however, is really required as shall fit the student to enter intelligently upon the course of study prescribed in our schools.

With such a preparation as is here sketched out, the candidate is fitted to begin his Dental course.

Most parties appear to be satisfied with the general course of study now pursued in our colleges, and only seek to render it more thorough and effective, and to include as soon as practicable such additional subjects as Microscopy, Histology and such other branches as experience may indicate to be most desirable, without attempting to materially change the general character of the course.

But there is one point bearing upon this subject, to which it is our wish to direct your attention, and that is how far the curriculum of other schools can advantageously be substituted for that of our own. Inasmuch as Anatomy, Physiology, Pathology, Therapeutics, Materia Medica, and Chemistry are taught in both Dental and Medical schools, we will take the latter schools for our example as being more nearly allied than any others to our own.

First, Anatomy. It is not supposed that any one can obtain a full knowledge of this important science in the short course of study prescribed in either of the schools above mentioned. Therefore, the medical student has his attention directed to those particular portions of the body with which it is most necessary that he should be familiar. For instance, he may, in the very first week of his practice be called upon to assist a difficult delivery, where a thorough knowledge of the structure and relative position of all the parts involved is imperatively demanded. On the other hand the Anatomical knowledge of the recent graduate in Dentistry would be put to a very different test. Again, take any well educated medical man, and examine him in the structure of the teeth, and you will readily discover how much or rather how little he knows of that with which it is necessary that the Dentist should be entirely familiar. The same thing may be said of Pathology. How obscure to the mind of the physician are the symptoms of many of the diseases which have their origin in the Dental tissues, and which are so promptly and correctly diagnosed by the intelligent Dentist. So of all the other departments named, in which many other examples might be cited, but those already given serve to sufficiently

illustrate the point in question, viz: that a very different direction should evidently be given to the studies of the medical and the Dental student, even when engaged upon the same branch.

It may be said that both the physician and the Dentist should be prepared to meet any demands of a professional nature which would fall within the range of the branches taught in common by both schools. To this we reply that however desirable a full and complete knowledge of all the branches taught would be to both classes of practitioners such attainments are neither contemplated nor required, and would be entirely impracticable without greatly extending the period of pupilage of both schools. Hence the differences in the methods of instruction pursued in the two classes of schools, arise from the nature of the acquirements requisite for graduation in each. Therefore, it is of the first importance that the knowledge which is acquired by each shall be of that particular kind which will be most useful in their respective vocations.

But to discuss this point a little farther, let us premise that no one can be expected to complete the entire circle of knowledge, restricted though it may be to the topics relating to his profession, not even though he should devote his whole life to study. Much less could he be expected to do so who is compelled within a limited time to prepare himself for a specific duty and whose whole course of education is designed to fit him for that particular use.

The successful practice of medicine does not necessarily require that intimate knowledge of the structure, functions and diseases of particular organs which is imperative upon the practitioner of a specialty. Take Ophthalmy as an example. What graduate of an ordinary medical school would feel himself qualified to assume the practice of that specialty, without first passing through a course of preparation looking to that specific object, and which could be but illy gained in any one of our medical colleges. If this is true of the oculist, how much more so is it of the Dentist who requires a peculiar course of tuition in every department of study.

The comparisons which have been indulged in above are not made in disparagement of either the schools or the practitioners

of medicine. Medicine is a noble profession, and has deservedly risen to an exalted position in the world. But the whole scope and intent of medical education is *not* to prepare men for the practice of specialties, but for that of general medicine and general surgery. Hence the time and energies of the student of medicine, and the course of instruction pursued in medical schools are especially and wisely directed and adapted to the best attainment of the object sought.

So far, only that branch of Dental education which is to be obtained from books and from the teachings of the lecture room has been spoken of. This comprises only the science of Dentistry. It is only in this half of Dental education that the teachings of other schools can be made at all available. The other, and by no means the least important half, which we call Dental art, must be taught by Dentists alone.

To give, therefore, a brief definition of the term "Dental education," as we apprehend its meaning, we would say that it implies that joint education of both the head and the hand, which are equally requisite to constitute a finished Dentist, and to fit him for the highest practice of his art, and which in the opinion of your Committee can be acquired *no where* outside of our own ranks. Literary institutions may make scholars; Medical colleges may make physicians and surgeons; but Dental schools pure and simple can alone meet the advanced demands of our growing profession.

In concluding this report, let us glance for a moment at the system of education as at present pursued. We have no intention of treating the subject at large in this short report, but only propose to call attention to some of the more prominent defects in our present system.

Our whole system of education, both professional and general, is traditional. It comes to us from a former age, and has not yet, to any considerable extent, felt the regenerating influences of the present one. The old forms are tenaciously adhered to, the old methods are persistently followed, yet there is an almost universal sentiment abroad in the educational world, that some changes are absolutely required. A want is experienced,

and some there are who already perceive the direction in which improvement is to begin.

One of the evils most to be complained of and which should be one of the first to be remedied, is that of forcing the student to pursue too many studies at the same time, and of expecting that each student would make *about* the same progress in them all.

Minds, and especially those of the young, vary greatly in their capacities to receive, and in the facility with which they acquire and retain knowledge.

The mental powers are as various as the muscular, and we might as well expect all the members of a class to make the same rate of progress in their studies, as to expect that each could raise a given number of pounds. The limits of the intellectual forces are as variable as are the physical. The course of study, therefore, should be so arranged as to adapt itself to the varying capabilities of the members of a class.

Only so many studies should be undertaken by each particular student as he can advantageously pursue. We mean that there should be no stereotyped curriculum, which every student shall be compelled to adopt, or to which he shall be confined. But that each one may attempt as many subjects as he can pursue with advantage to himself, and of which he can get a distinct and enduring perception.

The object sought should not be to see how quickly a man can travel over a given amount of surface, but to see who can most thoroughly acquaint himself with all the features of the way he travels, and be best able to comprehend and reduce to practice all the principles and laws that he has studied.

We should, therefore, not multiply studies. We should rather reduce the number pursued at any one time, and extend the period of pupilage far enough to afford all ample time to reach the minimum standard.

The educational process is dependent upon the memory—not that exterior or outside memory which may become the mere recipient of an array of useless facts, which are forced into it by mere dint of tutorial perseverance; but that more interior memory which is only penetrated and opened when the student

becomes interested and comprehends the nature and uses of the subject in hand. This faculty possesses the power of calling up from the treasures of its store-house such things as are needed for use in subsequent life, and although this blessed gift is possessed in greater and less degrees by different individuals, it is capable of being developed and improved in all by judicious exercise and training. This faculty is also susceptible to injury by being overtasked The process of cramming the brain to repletion, now so common in nearly all schools, must inevitably impair its powers, by producing confusion and interfering with that systematic and orderly arrangement of scientific truths which is requisite to render them most available for future use.

Far better for the student that a little should be thoroughly mastered than that a great deal should be imperfectly learned. The great point is to be able to make *use* of our learning. To do this to the best advantage it must all be as ready and as obedient to the will as are the motions of the hand in writing, or the movements of the feet in walking. All must be so thoroughly incorporated into the memory as to be spontaneously produced at will.

We have only touched the great subject of Dental education. We have feared that its importance has not been fully realized, and in the discharge of the duty with which we are charged, we have endeavored to open the subject before this body, sufficiently to elicit discussion and remark.

C. W. SPALDING, *Chairman.*

ADDRESS OF DR. C. P. FITCH, THE RETIRING PRESIDENT OF THE AMERICAN DENTAL ASSOCIATION.

Mr. President, and Gentlemen of the American Dental Association:

Allow me, on retiring from this post of honor and responsibility, to give utterance to a few thoughts expressive of sentiments, which I design shall take the form of both congratulation and suggestion.

On assuming the duties of the presiding officer of this organization, which your decision imposed upon me one year ago, in the city of Boston, a city distinguished for its firm adherence to principle, as well as for its intelligence and vigorous hospitality, I must confess it was with mingled feelings of pleasure and anxiety that I accepted the office, and entered upon its arduous duties.

As the session progressed, in the opening of its business transactions, the coherency of its organic elements was severely tested; and although subjected to sharp, and in some respects crude assaults, yet the organization was found in no essential particular wanting either in vitality or strength. It was at this juncture, that your chairman realized the importance, and felt the need of a thorough parliamentary education. But by the exercise of your forbearance, sympathy and ready acquiescence in executive decision, this society was soon moving forward in the might of its strength, exercising its freedom under a clear sky, and upon a deep if not a smooth sea. Gentlemen, permit me to thank you for bearing with my inexperience, and for your hearty support, which eventuated in the establishment and continuance of order, harmony and genial feelings throughout the session. Thus, may these characteristics predominate in all our future deliberations.

The incumbent of this chair should bring to his aid a mind richly stored with dental truth; distinguished for honesty of purpose, self-reliant and self-possessed without arrogance; firm and yet forbearing; quick and yet impartial in deciding questions of law, order or privilege; courteous, yet inflexible and unflinching in all administrative acts. But chiefly should he be cultured in all the routine of parliamentary usage. This array of qualities is seldom seen to blend and render symmetrical and complete the individual character, yet enough of good qualities may be found in any presiding officer to command respect and esteem, if not admiration. Thus by a constant and earnest exhibition of confidence and respect much of that which is onerous and irksome might be removed from the duties of the executive office.

I wish to call your attention, gentlemen, in the few remarks

which I have to make, to a subject which I fear has received but little thought, and yet it is of such importance that to be indifferent or ignorant of it, is to commit a grievous if not a fatal error. The subject to which I allude is the conservation of the forces appertaining to the physical, mental and moral being.

Why do I give prominence to the physical nature by placing it first? Because it is basal in reference to all human development. If an architect were to elaborate plans and drawings of a superstructure with the foundations contracted to dimensions much less than the upper stories, the universal verdict would be either mental imbecility or insanity. It is equally as impossible to rear a mental or moral structure upon a feeble or sickly organization. Therefore a robust physique is indispensable to the origination of either mental or moral power.

It must ever be remembered that every physical function takes its origin under the domination and has its manifestation in the expenditure of force. That which originates is vital or primary; while that which enables function is secondary, or the product of organization.

For instance: The germ of every human being has incorporated into its interior nature a force, which force is rendered operative by certain conditions. When these certain conditions are present, the germ is unfolded and the immediate result of unfoldment is the multiplication of this germ or cell. Thus, under the direction and continuance of the primary force, an organ is formed; having its specific relation or function in the human economy. By a repetition of these acts all that constitutes the physical frame is produced.

The specific function of the organ is under the control of another force, which may be denominated nervous. This force is the product of organization, or the result of the first series of acts directed by the primary force. Whenever, therefore, the nervous force is either increased, diminished or exhausted, the organic function is disturbed in a corresponding ratio. Therefore, health, which otherwise would have been secured, is never attained. For health is nothing more than the result of harmonious functional action, of definite uniformity and intenseness. The nervous force not only controls function, but also

determines physical and mental conditions. This force is intensified through the will, also through affections and passions, as well as through the sympathies, but more particularly through the positive or negative conditions of body and mind.

This last source of influence is always rendered operative by contact. Perhaps no professional calling is so susceptible of this disturbance of the nervous force, as is the Dental. The very nature of the calling itself, seems to invite antagonistic and annoying influences, and with a certain class of patients, this continually. After a few years of incessant Dental toil, it leaves its unmistakable mark upon many a genial spirit; converting the gentle and amiable into the impulsive and morose; poisoning the fountain head of thought; distorting, and rendering offensive the aggregate of human action.

The worm which is eating out the vitals of our American life, is an intensified nervous condition. This feverish excitement has a pernicious influence upon every faculty, exhausting and prostrating nature by the intensity of its own activities. We see this peculiarity, in a greater or less degree, in every department of human energy. But in no calling does it stand forth more prominently than in our specialty. Not a few patients draw upon the very fountain of sympathy, while others make an incessant appeal to our irritable and exciting natures. Probably no one in our profession is exempt from this modeling process. While over some it obtains such entire control, that we behold them radically changed in their natural characteristics.

The efficiency of not a few of our professional brethren is by this cause greatly diminished. While some are early incapacitated for rendering appropriate service, others leave the profession entirely, and a few continue in active professional employment only to impress unfavorably all those who come within their influence. Thus family and friends, patients and acquaintances are at times subjected to annoyance and abuse, and in some instances to maltreatment. I do not wish to convey the idea that members of our profession are "sinners above all men," or that they are wanting either in moral, mental or physical status, on the contrary, all that is great, noble, generous, sympathetic, cultured, refined and executive is exhibited by

many in our specialty. But, gentlemen, I am speaking of the tendencies or influences to which Dental men are subjected in their life employments; of influences which develope and mature character, determine mental and moral strength, as well as physical conditions.

When we survey the entire field of practice to which the Dentist is introduced, and perceive the influences to which he is exposed, it is a matter of surprise that so many remain firm in their integrity and stand forth as noble representatives of our humanity, presenting to the gaze of a world, excellencies of an expert and educated hand, a cultivated mind, a refined taste, and a vigorous christian symathy.

What then, gentlemen, are the practical lessons to be derived from these considerations?

1st. While implicit reliance upon the Supreme Being is essential to true success in every department of human enterprise, especially is this the case in respect to the Dental profession.

2d. Self-possession or self-control is of the highest importance. Without this the Dentist becomes the plaything of circumstance, and never need expect to reach any degree of professional eminence or social influence.

3d. Obtain, if possible, by the kindlier offices of gentleness and firmness, the entire control of those who place themselves in immediate contact with you for Dental operations. In other words establish compatibility. If this end cannot be secured, better dismiss the patient; for services thus rendered will be but half performed, or attended with too great an expenditure of our vitality.

Depend upon it, gentlemen, one hour's toil upon such a patient will exhaust you more than all day devoted to one who is in a compatible frame of body and mind. It is my firm conviction, dissimilarity of mental and physical conditions, from whatever cause arising, is the source of greater perturbation of mind and prostration of body than all other causes combined.

It is high time that the profession should awake to this fact. Impress the patient with truthfulness, gentleness, and the capability to perform in an eminent degree all the delicate opera-

tions of our specialty, and very much is accomplished towards this end.

4th. Every operation upon living Dental organs, or their substitutes, so far as affecting the operator himself, should be the result of his highest effort, under the guidance of an educated Christian conscience. If the reverse of this is the fact in practice, the reflex action will be highly deleterious, gradually impairing the most distinguished capabilities. Operations upon the teeth, but poorly performed, is labor lost.

Having briefly indicated a few of the practical lessons, to be drawn from our professional duties, I leave this subject with you, gentlemen, to be fully amplified in daily practice; hoping that they may be received in the same spirit that dictated them, thus tending to the elevation of the standard of professional excellence and efficiency.

And now, gentlemen, I am happy that the mantle of this office has fallen upon one of the bright lights of our profession, distinguished for hand, head and heart qualities. Let me ask for him the same courtesies that you have extended to his predecessor.

Thanking you again, gentlemen, be pleased to accept the honest wishes of my heart that the prosperity and harmony that have characterized the past history of this organization may be but the opening dawn of its future destiny.

REPORT ON PATHOLOGY AND SURGERY.

BY W. H. ATKINSON, M.D., D.D.S., CHAIRMAN.

A FULL report on the past, present and prospective status of Pathology and Surgery, would involve an exhaustive analysis of the departures from health demanding *Surgical* interference; therefore, taking for its basis all normal functional activity, the survey leads us from this initial step of departure from health throughout the manifold and devious windings of the struggle to maintain life and completeness of form and function in every

tissue composing the body, so that the task becomes truly Herculean!

First, to note the origin or origins of disease or diseases, and then to observe the appliances and procedures that are capable of arresting, intensifying or in any way controlling by assistance or opposition, this effort to maintain the integrity of the system by a constant renovation and reproduction of the anatomical elements, of which the tissues and organs consist.

Metamorphosis of tissue, then, is the process, the understanding of which becomes a necessity to us, to enable us to distinguish the integrative and disintegrative modes of its expression in normal and abnormal play.

The quantity and quality of food supplied to these anatomical elements, becomes an essential condition to health. Deterioration, deficiency, or excess of this supply, institutes departure from equable waste and repair of the tissues, which is Pathology in the degree of its presence and power.

The chief difficulty in the way of advancement in Pathology and Surgery consists in the persistent purpose to remain in the crudities of past apprehensions of primal bodies and anatomical elements, whereby we are overloaded with bad nomenclature involving misconception and mischief.

Probably the one mistake most glaring, and most mischievous to a true pronouncement of Pathology and Surgery of bones, is, the assumption that the periosteum is a bone producer and bone nourisher; to which it is as much entitled as scaffold-poles are to being regarded as the builders of the architectural proportions of the houses we live in.

Bones are organs produced for the uses of the body, out of the chaotic magma which holds them in its proper grasp in their amorphous, unpronounced presence and power. The means by which bones are evolved out of this homogeneous heterogeneity consists in a series of cells in alternations of generation and obliteration into the solid, which is properly denominated bone.

That form of cell called osteoplast, or osteoplastic, is the *sine qua non* to this highly important structure of the organism.

Periosteum is simply a congeries of connective-tissue cells,

which properly limits the boundary of bones on the one side, and soft parts on the other, and therefore, can have no function other than this of limitation, and supporting the vessels and nerves which pass between its meshes and interlacements. Therefore, the elemental cells which constitute this condensed areolar, or connective-tissue, are the media of nourishment and maintenance of the periosteum, for the purpose of bounding and protecting congeries of tissues and organs.

This veritable structure is variously called, in accordance with its location, *periosteum*, *perichondrium*, *perimysium*, *capsule of glisson*, *&c.*, *&c.*, all of which are indicative of its proper function of limitation, and are negative proof that it cannot produce, or nourish bone, cartilage, muscle, or liver.

Every organ enclosed within this connecting envelope, has its own proper elemental, anatomical, constituent bodies, the proliferation of each of which produces and nourishes the proper organs, maintaining them in their integrity and usefulness.

These organs, or rather elements of the various organs, produce and sustain the bodies they compose by a metamorphosis called nutrition. The source of this nutrient pabulum is primarily the food we eat; secondly, the blood stream resultant upon its digestions; and thirdly, a refinement of this same fluid by a further digestion in and about these cells, or primates of organs, which fits it to become granular mass, and formed substance, capable of rejecting excessive and offensive quantities and qualities of this blood proper, or cell food, whereby the nutrition of the part is normally maintained.

Liver is composed of and nourished by the hepatic cells. Cartilage is composed of and nourished by chondroplasts. And bone, in like manner, is produced, nourished and reproduced by the sole presence and function of osteoplasts.

In all cases where periosteum has been supposed to be a reproducer of bone, there has been a stratum of osteoplasts pulled or torn off the bone with the periosteum, out of which the succeeding bones have been so satisfactorily produced and hardened.

In all surgical manipulations, the primary points to observe and secure are to prevent the entrance of anything capable of

unfavorably acting upon the primal or anatomical elements, and to secure their proper food, exercise and rest. Just how this shall be done, and what are the substances capable of acting upon them as food, poison or medicine, would involve the whole round of the principles and practice of an enlarged Pathology and Surgery.

ESSAY ON WEDGING THE TEETH.

BY CORYDON PALMER, D.D.S., WARREN, OHIO.

Mr. President and Gentlemen of the American Dental Association:

Permit me to offer my views upon the above named subject. Of the various modes of separating the teeth, to obtain space for filling, in my opinion the wedge is the best.

The manner of introducing the wedge may claim our attention still farther. It has been fully demonstrated to us that we may, with care, drive a wedge between the teeth, so as to obtain the desired space for filling, within a comparatively short period of time, with little or no injury to the parts involved. The constant daily use of the wedge has, I think, indicated to me ways of introducing it in such a manner as to be easier for the patient, and more effectual in obtaining the desired space.

I shall first mention the present mode of practice which is, so far as I know, to introduce the wedge at the necks of the teeth, and force it by pressure or driving until the desired space is gained.

I will now speak of my own mode: Instead of using a single wedge, I would use three or more. Suppose a space to be desired between the incisors, and it is decided upon to use the wedge, my first step would be to prepare, from the pivot wood of the watchmakers, three wedges, made from the full length of the straight and well selected pivot wood, the first one shaved off broad and thin; the second, narrow and thin; the third narrow but thicker.

To wedge the teeth, as a general rule, I would introduce the

broad, thin wedge, No. 1, even with the cutting edge of the incisors, and drive until some space was gained, then I would introduce the narrow thin wedge No. 2, and drive gently, next, I would cut off No. 2, and insert the point of No. 3. Next, drive No. 1, and then No. 3, so alternately, all the time endeavoring to make No. 1 do the opening, and No. 3 hold that which is gained, and No. 2 act as a shield to the sensitive, soft tissues, and an easier plane for No. 3 to glide upon, thereby preventing No. 3 from slipping up too far into the gum, and preventing a large share of pain and real suffering consequent upon driving a single wedge upon the unprotected, sensitive parts.

Still farther advantages are gained by this mode of wedging; for instance, after the filling is packed and partially or nearly filled up, No. 3 may be removed, letting No. 2 remain, thereby leaving the margin of the cavity nearest the gum in clear view, so that it may be trimmed with a certainty of being clear and perfect.

In case the teeth that are to be separated are decayed, and the face walls of their cavities are thin, I would recommend the use of a very thin chisel, or a file to prepare them before introducing the wedge No. 1, and by that means guard against the danger of fracturing their thin, front walls. The use of the wedge serves the double purpose of separating the teeth and keeping out of the way the points of the gum, and moisture between the teeth.

In wedging between the bicuspids and molars, their form and relation to each other are frequently such that wedges introduced from the outside fail to keep out of the way the gum, and stop off the moisture. In that case, I would introduce wedges from the inside, lastly, in addition to those first introduced between the teeth on the outside, letting the last inner wedge's point pass on top of the outer ones, so that when force is applied to both the outer and inner, all will be made tight and secure.

We should not forget that the wedge may be used with great advantage where there are missing teeth, by making it broad enough to extend over the space where the teeth are wanting,

and press upon the adjoining teeth in such a manner as to keep out of the way the gum, and stop off moisture.

The mallet is the best force to use to introduce the wedges, and it should have weight enough to be effectual. A light mallet irritates the nerves of the patient, hurts them more, and fails to do the work properly, and should be carefully avoided.

In introducing the wedges, care must be taken not to force them too fast; but after two or three strokes of the mallet, wait a little time, and then drive again, and proceed in this manner until the desired space is gained. I mention this fact because it is quite surprising to see what the effect of direct wedging is for separating the teeth, and how little injury will be done to the parts, if care is taken to conduct the operation properly, and not force the wedges too fast.

REPORT ON DENTAL CHEMISTRY.

BY A. LAWRENCE, D.D.S.

Mr. President:—In presenting a paper to this Association upon the subject of Chemistry, I am fully aware of the magnitude of the subject and of my own inability to do it justice. No one is expected to endorse or reject any portion of my remarks contrary to his own convictions; nor will the Association as a body be desired to depart from a wholesome rule in regard to matters of this kind. My colleagues on the committee are as fully exonerated from any faults in this communication, as they are free to share in its merits, if any, as in this instance I have assumed the responsibility of acting in my individual capacity, while at the same time entertaining no other feelings toward them than those of the highest respect.

Chemistry implies all the agencies through which power is exerted upon the tangible and intangible—is, in fact, the key to the operation and solution of all the forces in the universe. By the laws of chemical election, attraction and repulsion, electricity and magnetism, though severally resolva-

ble into the unity of force, the planetary hosts have been evolved and maintained in their stupendous revolutions.

Chemistry is the right hand of the Infinite, by which he has formed all things—from oxygen and hydrogen gases has compounded the mighty oceans, and the gathering mists, whose falling aggregations water the earth, giving life, luxuriance and beauty. It fans the air into gentle breezes, or creates the whirlwind. It blossoms in the flower, shedding its fragrance for its own uses, and our delight, and dwells in the decaying carcass. It is this which furnishes us with food and raiment, air and sunshine, with all we have, even to ourselves, and is without begining or end—is eternal and progressive, our progress rendering chemical agency more apparent in the evolution of the world of forces.

But the most common apprehension of our subject, though not wanting in importance, generally consists in the analysis and synthesis of specific substances—a statement of the laws which govern in any given case, of what properties possessed, how constituted, etc., without arriving at the soul of the matter. Even this view of Chemistry is indispensable, especially so to one who desires knowledge more than gold.

All the sciences are but scintillations from this central gem; therefore, he who would excel in any favorite field of investigation, must first become familiar with the rudiments, at least, of that science upon which his ideal feeds.

Would he become truly learned and useful, rejoicing in the consciousness of his qualifications, sweeter to him than honeyed waters, and richer by far than golden treasure, he must bend himself to the task of securing the prize as it daily and hourly passes inviting his grasp.

The progress of all science is the result of the intellectual operations of the mind, whether directed to material objects or whether employed in contemplating itself. This is illustrated in the advancement of agriculture, the progress of Chemical knowledge, and in the growth of Physiology; they are not outward mechanical things, but the result and registers of mental effort—are the accomplishment of the mind's conception—results of significant import as foreshadowing a future growth of know-

ledge far beyond our present ideas of possibility. The discovery of Gravitation, of Oxygen, Vaccination and Anæsthetics—the invention of Gunpowder, the Printing Press, the Steam Engine, the Electric Telegraph, and many useful appliances in the arts, have revolutionized and reconstructed human relations, and brought the world nearer to itself, "prophetic of a new dispensation of the intellect—of a wider and nobler culture, in which the living universe of God shall neither be contemptuously passed by, nor assigned an inferior place in the courses of study."

You expect me to demonstrate the applicability of Chemical science to the profession of Dentistry. Its general importance *should* constitute a sufficient rejoinder, and incentive to its pursuit, but I am apprehensive that the great body of Dental students and practitioners do not fully realize this statement. That the most of us are far too deficient in Chemical knowledge will, I think, be generally admitted; but I dare not admit, that of the seven or eight thousand Dental practitioners in the country, scarcely one per cent. are good Chemists, nor that many cannot even state the composition of pure water.

These fears apply with equal force to the graduates of legally chartered medical colleges whose alumni ought to know that Chemistry makes our diseases and cures them. Why does this state of things exist and to such an extent? Is it because the sacrifice of much valuable time is necessary to achieve a passable proficiency? Let us remember that victory is never obtained except through sacrifice. Is it said that Chemistry is dry and uninteresting? Our zealous industry in the pursuit of this knowledge will moisten the subject with the waters of life and light that flow from the fountains of heaven, and the well garnished chambers of the brain will resound with the melodies of victory. It is the province of the Dentist to renovate, preserve and protect the portals of the house in which we dwell—to see that the ivory servants in waiting are in condition for service, as well as for ornament—to instruct its occupant in much that pertains to its comfort, and to raise a warning voice against the intrusion of hurtful guests, and also, to urge the attendance of such as help to maintain a useful and undisturbed possession.

To intelligibly and properly discharge this trust, he must become cognizant of the chemical constituents of the human body, before he can determine, with even proximate certainty, what elements are essential in the food with which it is proposed to supply the waste of the tissues, and maintain health.

The existence of several analyses both of the body and of most articles now in use as food, are matters of record with which, it is presumed, all Dental libraries are furnished, therefore, I refrain from wearying your patience by listening to their quotation.

What we are, results in some degree from what we eat and drink. Here permit me to suggest, with due deference, that this Association ought, in justice to its professional behests, to deprecate the dictates of the fashion in dietetics which virtually starves us in the midst of our surfeits of fined, refined and superfined food. We sift from our cereals the best portions of the grain, and

> To eat the worst we most incline,
> And feed the best to filthy swine.

A deferential compliment we can illy afford to extend to those animals with our present claims to superiority.

Vigorous manhood and mental greatness are not the legitimate fruits of culinary fantastics, and can only be secured and maintained by a strict adherence to the rules of common sense, and plain cooking of plain food. The Dentist, of all other men, ought to inculcate this principle, not only by precept, but also, by constant example, that the world may take knowledge thereof, and follow in the path which leads to human perfection.

The waste, as it is called, of our bodies, is only the loaning of certain chemical constituents, and demands full and prompt payment in kind, or vital bankruptcy ensues.

Here, surely, is a field for the exercise of Chemical knowledge through which to influence, to some extent, the propriety of development, from the child in utero, to ultimate manhood.

Dr. N. J. Bellows, of Boston, speaking of food, says: "It is well known that our pale faced girls, and our feeble minded children, are brought into that condition mainly by living on sugar, butter and superfine flour, out of which have been taken

the elements that make bone and blood, and give energy to the brain and nervous system, and the common sense remedy for all these terrible evils is to be found in a simple resort to nature's own storehouse—abundance of wholesome food." Emerson says, "If we would be healthy, we must live hard, and sleep hard." To which I would add a responsive amen.

Teeth wanting in calcareous elements, presenting a soft, almost cartilaginous structure, easily decaying, and which, notwithstanding our best manual efforts, rapidly pass on to destruction, are but marginal notes to the human volume, and appeal to our aid and prescription to inaugurate a better condition of the Dental tissues through an improved diet. Success in this direction is not problematical, nor will the practitioner who intelligently acts in such cases fail to receive a soul satisfying recompense.

In the foregoing remarks, Mr. President, I have purposely refrained from arrogating to myself the functions of the teacher, as I do not understand that it is the object or design of this Association to exercise the prerogatives of our Dental colleges, but rather to regard the peerage here, universal.

Under this impression in the discharge of my duty as a member of the committee on Dental Chemistry, I have intended to report the state of education upon the subject assigned, in all candor and without malice; and in this spirit I repeat that there is too little attention given to the importance of Chemistry among the members of our profession.

This fact is too apparent to admit of much argument, nor can we expect a very much improved state of knowledge in this science without earnest individual exertion.

Let us begin with the text books, of which there are so many excellent ones, and as we progress, progression becomes as part of our being, and we shall expand in mental capacity until nothing short of the mastery will satisfy our desire for growth in knowledge, in part to be realized on earth, and complete fruition, permit me to hope, when we shall have passed to other scenes beyond, when we shall fully realize the utility of the subject to which I have at this time briefly called your attention.

TO THE AMERICAN DENTAL ASSOCIATION.

The Committee on Dental Physiology offer the following paper

BY HENRY S. CHASE, IOWA CITY.

THAT DENTITION is a natural physiological process ought not to be doubted. Many, indeed I think the majority of, writers on medicine have classed it among the *causes* of infantile diseases. That there are very many diseases peculiar to the period of dentition cannot be denied. But they are only so, owing to the remarkably impressible condition of the infantile vitality or constitution, just as a young and succulent vegetable growth is easier marred or injured than that which is more matured. And as the young vegetable growth more quickly recovers from mechanical injury than the older one, so do the constitutions of children more quickly recuperate after the morbid cause is removed than do those of adults.

It is not strange that these facts are so patent, when we consider the wonderful activity of the processes of NUTRITION, growth, and disintegration. In a normal condition the frequency of the heart's action indicating the rapidity of the sanguineous circulation, is a true index of the rapid changes taking place in the young growing tissues.

When from a sufficient cause a cell is changed from its natural physiological condition, whatever that may be, its proliferation both as to rapidity and extent is in proportion to the quickness of the chemico-vital changes of the individual whether he be young or old. And thus it is that the new being in its flushness of chemico vital processes coming in contact with morbific agents inimical to health and life of older and more stable organizations, is itself easily impressed with their forms, and multiplies them with the force natural to its vitality.

On the other hand we stoutly contend that no natural physiological process in one set of organs should or does necessarily induce disease in other portions of the body which is in a natural condition.

The laws of NATURE are all in mutual relation or harmony, and it would be a reflection on Divine Wisdom to admit any

proposition to the contrary. Therefore, I reiterate the fact that Dentition is not necessarily a cause of disease. But the converse *is* true; namely, that disease is a fruitful source of mal-dentition.

What is usually termed DENTITION is the process of ERUPTION or passage of the teeth through the gums. But I think a better definition would be this, namely, *the formation, growth, and eruption of the teeth.* And on this basis I make the following remarks:

The derangements of dentition commence *early* in GESTATIVE UTERINE LIFE. We may not place the period later than the fourth month, or when the dentification or calcification of the germs is fairly under way.

The foundation of mal-dentition is often laid still earlier than this, namely, at the moment when the OVUM is impressed with the vitality of the spermatozoa, and the NEW BEING is at once created, and receives its law of development at that same instant, with all its peculiarities stamped upon its yet unshapen members, subject only to modifying causes affecting nutrition. For on the physiological nutrition of the new being depends the strength, permanence, and vital forces of its individual organs.

MAL-NUTRITION depends upon

1st. The non-ingestion of proper food.

2nd. The non-ingestion of sufficient food.

3d. Non-digestion or imperfect digestion.

4th. Non-assimilation, or imperfect assimilation.

The two latter are often produced by Idiopathic, or constitutional disease in the mother.

TISSUES cannot be formed without material. The *mother* must provide this during the whole period of gestation and lactation, not only for her own body but for that of her growing child. In health, nature furnishes the mother with an *extra* appetite for food, causing her to eat an extra diurnal amount, corresponding to the demands of the new being. If food of natural proportions, or that which has not been robbed of its *natural elements* is used by the mother, the desirable end will be accomplished. But if this is *not* the case; if, for in-

stance, the *starch* of wheat is used as a factor of nutrition to the exclusion of the gluten and the inorganic elements which the *whole* berry contains, then all the tissues of the body must suffer.

TRANSFORMATIONS of tissue must go on whether food is ingested or not; and disintegration of every tissue of every organ will daily take place in very regular and definite proportions both in conditions of nutrition and starvation.

Whatever chemical analysis proves to be the constituents of any tissue, must be furnished by the blood, or that tissue will diminish in weight, whether it be muscular, cartilaginous, osseous, or other.

Starch cannot take the place of gluten, neither will soda or potassa interchange with lime.

In my Report on Dental Physiology, to this Society, for the session of 1866, I endeavored to show that the fine flour of wheat is unfit for the principal food of an expectant or nursing mother, as indeed it is for any other person. I think I succeeded in proving that it is very deficient in those inorganic elements which the bones and teeth particularly demand for their formation and preservation. I also endeavored to show that the universal use of this article of diet in the United States is the *principal* cause of defective teeth in this country.

There is no *discord* in the laws of nature; for every physiological necessity there are means for its satisfaction. The CREATOR has placed in every variety of food the proximate elements required for the nutrition of the body. The ingenuity of man alone has sacrificed the good and the natural to the gratification of his depraved tastes. The whole brute creation obeys the laws of nature, and reaps the rewards of health.

The practical lesson which I wish to impress on the mind is this, namely, that those who intend to be parents should have their own dentures in a sound and healthy condition *before* they cause the conception of a new being. As peculiar conditions of the system are transmitted from one generation to another, parents cannot be too careful that no taint of theirs shall curse their offspring. Acting in accordance with the laws of enlightened hygiene, will insure this.

In addition to this the *constitutional* diseases which impress their types on progeny with such fearful constancy must be cured. The most dreadful of all these is SYPHILIS. There is none more fatal to Dental nutrition and growth than this. Its unrelenting grasp holds Dental development in check to the third and fourth generation. It may almost daily be seen in notched incisors, eroded enamel, and defective dentine.

MERCURIAL DISEASE is hardly less fatal to the teeth and causes similar pathological sequences.

CONSUMPTION as well as the two diseases named produces dwarfed teeth. Consumption causes pearly looking teeth, with calcification incomplete. These decay readily, and cut easily with an excavator even when not decayed.

If the teeth of parents are in a healthy condition, even if many of them have been decayed and are now plugged, and the general health is good, and no constitutional taint is present in the body, there need be no fear of transmitting to the offspring the influences of imperfectly organized teeth, provided the normal acts of nutrition are not afterward thwarted by disregarding the laws of Dental hygiene. To this end the mother must ingest sufficient food containing osteogenous and Dental constituents in *nature's proportions* in order to furnish the child which she carries, with all it needs.

There is no mystery or difficulty about this. Excepting in substituting fine flour for that which is *unbolted* there can hardly be a mistake. Lean meats, meal of all the cereals, the legumens, garden roots, and fruits are all suitable. And then there is MILK, which deserves letters of gold, cheese and butter. Fermented and spirituous liquors can add nothing unless they idiosyncronise and promote digestion and absorption. Cleanliness of the skin; purity of air; sunlight, together with exercise in the open air, become almost indispensable adjuncts to diet in Dental or general hygiene in CIVILIZED LIFE.

If the TYPE of American teeth is ever to be improved, so that they may become a *blessing* to the majority instead of as now a curse, Dental Physiology must point to CONCEPTION and GESTATION as the periods for the commencement of those important measures which are to accomplish the great work.

Here is not only legitimate work, but the *real* work to do. If "an ounce of prevention is worth more than a pound of cure," then here is the *remedy* which faithfully applied will prove a blessing to this nation, and perhaps to the world.

As GESTATION is as much a physiological process as sleeping or cutting teeth, there are no diseases necessarily consequent upon it. There are a few AILMENTS COMMON TO GESTATION, of which I will briefly speak. The first is

MORNING SICKNESS.

This is, certainly, not a disease, but is just as truly regarded by the mother as an ailment, at least, from which she feels that she would only be too happy to be relieved. Yet it probably is not usually cut short or cured by *medicine* without detriment to the mother, for it is undoubtedly a physiological act; a preparatory act for the better nutrition of the system. Is it not an effort of Nature to prepare the body for a more perfect assimilation of food, to increase the appetite, to strengthen the powers of digestion, thereby furnishing the embryo with abundance of material for development and growth? Women in savage life are subject to this condition, so are some animals, at least I have observed it in cats and dogs. Therefore, unless this condition becomes abnormally developed, by latent constitutional psora, or bad habits, it should not be interfered with.

CONSTIPATION is another ailment common to gestation among flour eaters. Those who use unbolted wheat meal rarely suffer in this respect.

HEMORRHOIDS or piles is another trouble common to the same class of persons. Although in advanced stages of gestation there is a natural tendency to produce prolapsus of the large intestine, yet it does not take place where the principles of enlightened hygiene are obeyed. Piles is not an idiopathic disease, but only a symptom consequent on a disturbance in a more distant portion of the body.

A consideration of these ailments in all their bearings would carry me too far away from the main subject which is not therapeutical, but hygienic.

It is very important to secure for the expectant mother un-

interrupted good health during the whole period of gestation and lactation; therefore ailments or diseases must be promptly met by all the hygienic and therapeutical means at our command.

Whenever sickness is serious enough to affect ingestion and digestion even for the space of one month it will inevitably leave its marks upon the microscopical structure of the teeth. The proximate cause is innutrition. When this takes place early in gestation, say before the fifth month, the Dental germs which are in a soft and pulpy state are arrested in growth and receive an impression which often dwarfs them in size. Not only does this happen to the milk teeth, but the bulbs of the permanent ones are affected also. But the latter undoubtedly are more seriously affected after birth up to the fifth year by the causes mentioned.

It has often been observed that some children are "small of their age" up to five or six years or older, and that they afterwards "take a start" and grow to the full size of the womanhood or manhood which their parentage warrants. Now as teeth cannot enlarge in diameter after the calcification of the enamel and the coronal ends of the dentine tubes, they necessarily remain of the diminutive size which they were forced to take by starvation. And thus it is that we so often observe in the mouths of adults teeth which properly correspond in size to those of the milk teeth. Especially is this to be observed in lateral incisors, canines and bicuspids. I would suggest that the contour lines or shadings so often seen in the dentine of these teeth are the result of arrested development, showing the size and shape of the bulbs at the time. Sometimes there are several of these in one tooth corresponding to successive arrests of growth.

The lacunæ or interglobular spaces in dentine are very likely the result of arrested development in the dentinal corpuscles, from a lack of nutrition also.

That these effects may be afterwards remedied by good health and a better nutritive supply I do not doubt. But the importance of the mother's health for the perfect development and growth of the dental tissues is hereby shown.

Dental Calcification is a long process, and continues from the fourth month of intra-uterine existence far beyond adult life. It is seen not only in the increasing hardness of the teeth as age progresses, but also in the actual transformation of the Dental pulp into a substance resembling bone. A *calcification* in fact of its connective tissue.

At the period when the new being is ushered into a new world no teeth are yet erupted, for none are fully formed, and therefore nature kindly furnishes the child with a pabulum for its nourishment requiring neither mastication nor an effort of the will to fit it for its digestion.

Notwithstanding the changed relations of mother and child as regards position and mode of nourishment, yet the fact still remains as plain as before that her blood should be a magazine plentifully supplied with lime salts for the continued development and perfection of the Dental organs. From birth until weaning is the period in which the *drain on the mother's blood* is most severe, and as lactation goes on, the teeth become rapidly diseased in many cases, and caries of the dentine is more or less developed according to the present and previous hygienic habits, and health of the mother. The activity of Dental decay in these unfavorable cases is in strong contrast with that of unmarried women and men. Fractures of the bones also heal with difficulty owing to the diminished quantity of lime phosphate in the blood. Not only do the osseous and Dental tissues of the mother suffer, but the whole system is under a general *malaise* consequent on the lack of these salts in *every* tissue of the body. The brain, which uses up so much phosphoric acid in the operations of the mind, is dull and feeble, and the muscles pale and flabby, and incapable of their normal work.

At this period it is customary to apply to the Dentist for professional aid, only however to solicit his *surgical* and *mechanical* skill; *rarely* to ask advice relating to hygiene. Who is to blame? Without doubt the Dental profession which has not yet come up to the standard of Physiological science which the Age demands.

When we have all learned the necessities of a mother famish-

ing for the lack of the necessary elements of nutrition, mothers themselves will become aware of their needs through our instructions at the Dental chair, the social circle and the public press, and will apply to those for aid whose duty it is to render it.

A mother in this condition should not be sent away with patched up teeth merely, but with that knowledge which shall gradually build up again her disintegrated tissues as rapidly as Physiological laws will admit. This is not impracticable, it has often been done.

I have sufficiently spoken of *natural* food. I repudiate all inorganic chemical food from the laboratory of the chemist; it is a fallacy to suppose that *artificial* lime salts will produce the desired results. Only so far as they may act medicinally to improve digestion and assimilation will they be of benefit. Nature will reject them as *factors* of nutrition, as the urine and fæces will show.

The particle of phosphate of lime which is intended to become a portion of bone or tooth must first have received a certain degree of vitality or life by the wonderful force of the VEGETABLE CELL *before* it can become a living portion of the ANIMAL CELL. No! follow NATURE! give the food which she so bountifully provides for her children, and she will respond to your endeavors by granting your earnest desires.

The custom of FEEDING BABES with starchy and gummy substances is both unscientific and practically injurious. Starch produces fat; gum is not digested at all.

It is the *fashion* to fatten babies, mothers undoubtedly thinking it a true indication of perfect nutrition. This is a great error. True health consists in the normal performance of every function of the body, and this can take place quite as successfully with a small amount of adipose substance as with the system burdened with it. Indeed excess of fat is not normal but rather pathological.

Children should not be *fed* at all, if possible, until nature has given a hint for additional food by the eruption of the incisor teeth. Then lean meat is preferable to vegetable food, and will be found to be of easier digestion.

The ERUPTION of the milk teeth is a period full of dangers to the health and life of the child in civilized life. Leaving out the catalogue of contagious diseases, nearly every other ailment may truthfully be laid to the violated laws of hygiene; or the inherited latent diseases of SCROFULA and SYPHILIS. The ignorance of parents on this subject is terrible, causing a destruction of life which is painful to contemplate.

The eruption of the teeth being a physiological process as innocent as digestion, should not bear the obloquy which is so universally and erroneously attached to it. I cannot discuss this subject upon which I feel so much interest, because it would carry me far beyond the limits which I had prescribed in this paper, and I will therefore only say that I believe that almost every one who will give enlightened thought carefully and patiently to this question will come to similar conclusions with myself.

The violated laws of infantile hygiene, and the diseases which are forced upon the innocent being by the sins of others, retard and complicate the process of eruption to an alarming extent. Extending as it does over so many months, with the teeth in such a variety of stages of progress towards growth and dentification, and absorption of the gums to admit of the passage of the crown, these diseases are constantly interfering with the beautiful cellular changes which are necessary to carry them all through to perfection. And it is indeed wonderful, and a cause for our hearts to swell with gratitude to our CREATOR that He has made Nature so persistent, so patient in endeavoring to accomplish her good work notwithstanding the ignorant and provoking interferences of vain man.

The treatment of infantile diseases then should be entered upon with the understanding that the eruption of the teeth is not the *cause* of any of them; and that the welfare of the Dental organs imperatively demands that all pathological conditions of the body should be as quickly removed as possible, that nature may be able to continue her wonderful work of dentification and eruption.

In regard to the process of eruption itself there is danger of too much meddling. We are too apt to think that nature is in-

competent for the proper performance of her work, and therefore, many of us cut the gums of the little innocents at the beck of any ignorant mother or nurse in charge, without regard to condition.

The gums ought not to be cut, whether sick or well, unless there is distinct swelling or inflammation. If it is for the liberation of a tooth we must be sure that it has sufficiently advanced and that there is an upward pressure which cutting will relieve. If to relieve congestion, only the mucous membrane of the gums should be cut. Deep cutting is not only dangerous to the mechanical texture of the tooth, but also to life. FATAL HEMORRHAGE has often been the result of deep incisions. The supply arteries are large in proportion to the tissues which they are so busy now in feeding, for where there is so much to build there must be abundance of material.

If there are any who consider that INFANTILE DISEASES is a subject beyond the limits of the Dentist's sphere, I beg them to remember that nothing is beyond the legitimate sphere of an *educated* and *intelligent* Dentist, who desires to see the beautiful works of God restored to that place in the Temple of Nature where He first placed them in his Infinite love. To this end let us all strive until we shall no more hear the impious remark. so often made in our offices, "Why did not God make the teeth to last as long as our lives?"

ERUPTION. This physiological process occupies from about the seventh to the thirtieth month for the first or milk teeth. This is certainly a very interesting and important period in the child's life. The mortality of children at this time of life is enormously out of all proportion to other periods, and is indeed frightful to contemplate. My views in regard to the dependence of infantile diseases upon the process of eruption have already been expressed. Hygienic measures of the very best kind should be adopted to bring the child of civilization, and perhaps the heir of hereditary diseases inimical to the highest attainment of bodily perfection, into such relations with natural laws, as will best neutralize all those untoward influences which render the thread of an infant's life brittle and uncertain.

The MOTHER'S MILK is one of the most important things to be

looked after, and one too almost entirely neglected. It is impossible to make good milk out of poor material. But my previous remarks on this subject will suffice. Still good materials may be spoiled by mixture with those which are decidedly deleterious. Although a mother may have supplied her blood with the best material for the growth of the body in general, and the teeth in particular, yet she may partake of condiments, relishes, and drinks which will disagree with the stomach of her child, and render it unable to digest the food she offers it. Even if digested and taken into the circulation by the infant they often cause an irritation in the histological tissues which results in disease. Onions and other food of that character cause vomiting of the child. Pickles and other acids cause griping pains and diarrhœa. Coffee produces vomiting, bilious colic, and great irritability of the nervous system. Tea and coffee cause great wakefulness. Undue excitement of the mind and passions have often killed infants as certainly as strychnine. Overwork, and heating the blood higher than normal, are very injurious to the health of the child. Medicines also, partaken of by the mother, are very likely to produce pathological effects on the nursing child. Surely there is nothing strange in the fact that so many die in infancy, when the laws of nature are so constantly violated and the little innocent placed in such inharmonious relations to physiological laws.

If a mother cannot furnish *pure* and nutritious food for her child, a wet nurse should be had if possible, who can do so, and not without.

Whatever best promotes the *general health* of the child will accord with the best health of its teeth. Therefore, dress, bathing, exercise, fresh air and the sun's rays must all be considered and appropriately applied for its benefit. A lengthened discussion of these topics in this paper would be inappropriate.

The first teeth seldom erupt irregularly, or rather they present to the eye when all *are* erupted that beauty and regularity which is so delightful to the mother, and the earnest physiologist.

There are tardy eruptions and premature eruptions of the first teeth. In extreme cases both conditions are symptomatic

of an impaired constitution, or previous arrest of development under influences which prevented nutrition. For it is generally the case that teeth erupted at birth or soon after, will be found devoid of roots in normal length. Such facts should lead the medical or Dental attendant to enquire into the present and past hygienic habits of the mother, and correct them if necessary. Placing mother and child in the best physiological condition, by whatever means are necessary, will be the best guarantee that nature will carry out her intentions in the perfect eruption of the child's denture.

It is never too early to begin the practice of cleansing the infant's teeth. Water is very grateful to most children when cutting the teeth, and the teeth should be bathed and cleansed with pure water after the act of suckling.

If it is said that this is unnecessary, and that animals and many mothers also, never do this, and still the teeth of their offspring are sound, I merely reply, that while the habits of mothers are artificial, and their present constitutions the result of artificial habits also, we must use artificial means to restore or promote the health of themselves and their offspring. Thousands of children lose their incisors before they are three years old by decay. This shows imperfect dentification and calcification of the teeth, but who can say that cleanliness of these organs during the period of lactation would not have prevented their chemical erosion by the acids formed by the putrefaction of the milk adhering to them, and the abnormally acid epithelial and glandular secretions.

The mother's milk has, in many instances, a tendency to rapidly sour and disorganize causing not only gastric and other constitutional derangements in the child, but also local lesions in the mouth.

The time of weaning a child must depend on the health of the mother and child. About the fifteenth month is perhaps the best, although it is better to vary the length of suckling so as to have the weaning in cool weather. In fact it is better that suckling should continue through the *second summer* if possible. The health of the child is thereby more fully secured, as gastric derangements are more apt to ensue if the child is

dependent on other food than the mother's milk the second summer. For at this time it has not erupted the molars, and mastication is yet imperfectly performed at the very time when it should be thoroughly done, if done at all.

Before weaning time has arrived the milk of the cow should be used in addition to that of the mother to some extent. Lean meats, finely cut, and broths of meat may also be used advantageously, if judiciously employed. Vegetable food should be gradually employed. It is not so easily digested by an infant as animal food. Very little vegetable food should be used before the child has cut its grinders. Starchy substances, such as corn starch, and fine flour bread, arrow root, &c., ought not to be used as food for the infant. Even if tolerated by the organism it is not natural, and foundations will be laid for gastric disorders which will more than likely take place in a year or two later under such a regime. Wheat finely ground but unbolted and divested of the coarse bran if moderately used before weaning, at the latter part of lactation, will give the child the best pabulum for blood formation, and lay the foundation for vigorous digestive organs.

A sudden transition from the mother's milk alone to other food is very likely to be disastrous in proportion to its departure from the proximate elements of the maternal milk.

Children should be taught to thoroughly masticate their food. The eruption of the grinders may serve as a hint for food which *requires* mastication to make it comfortable to swallow. The teeth absolutely require exercise for their best health, and food should not be given to children at this age that does not require it. One very obvious reason for the perfect teeth of savages and semi-barbarous people is found in the fact that everything they eat requires mastication to make it even comfortable to swallow, leaving out the heightened pleasure experienced by thorough comminution of food and its mixture with saliva. Mastication gives strength and vigor to the roots and delicate membrane investing them, and cleanses the teeth by attrition. The gums are also benefitted, and by continuity of tissue the other parts of the mouth and fauces.

By the end of the third year all the milk teeth are erupted,

in good *position* generally. They ought, also, to be free from decay if decent hygienic measures have been heretofore in operation. The child is now old enough to use a soft tooth brush and should be taught to use it after every meal and lunch. They may very properly be allowed to eat five times a day, but not oftener. A child who is always eating will be sure to have dirty teeth, which will soon result in erosions and decay, besides a sour and weak stomach.

Sweets ought not to be forbidden in moderate quantity. There is a natural craving in infants for saccharine substances; and there is no good physiological reason why they should not be allowed temperately. It is much better, however, to give a child white lump sugar than candies which often contain noxious ingredients. Sugar as sugar never injures the teeth; it is only when converted into acid that it acts injuriously. Neither will ripe fruits containing considerable acid injure the child's teeth when moderation is used in their employment.

The teeth of the child from their first eruption ought to be under professional supervision, but at any rate it ought not to be deferred later than the third year.

At this point I will leave the subject for I see before me a vast field for thought, which I must not now enter as it would lead me far beyond the limits of your patience; namely, THE PRESERVATION OF THE MILK TEETH UNTIL REPLACED BY THE PERMANENT ONES, AND THE CARE OF THE PERMANENT TEETH DURING THE PROCESS OF REPLACEMENT.

TO THE AMERICAN DENTAL ASSOCIATION.

REPORT OF THE COMMITTEE ON DENTAL PHYSIOLOGY.

In looking over the field assigned them, your committee have found it strictly limited on either side by the existence of committees on Pathology and Histology. The past year has neither made any substantial addition to our knowledge of Dental Physiology, nor brought prominently forward any special topic not belonging to one or the other of those committees; and

therefore, our only course has seemed to be to present a concise statement of recognized facts in Dental Physiology. We shall not aim to enlarge the field, but only to bring plainly into view what it is already known to contain, together with some hints of the directions in which we may look for future discoveries.

The first topic in the order of nature is the eruption of the teeth. Their gradual development and minute structure do not belong to this department; but the forces and methods by which the partially formed teeth are protruded from their follicles and made to assume their mature proportions and their relative positions, are strictly objects of physiological inquiry, and deserve our best attention. This subject had lain in the dark, notwithstanding much speculation and theory, until the exhaustive researches of Mr. Tomes, recorded in his "Dental Surgery," removed all its obscurity. His discoveries seem to have attracted so little attention, that we shall do our brethren good service by condensing them into a single view.

Perhaps the most interesting of Tomes' discoveries is that osseous tissue, instead of presenting a difficult barrier to the evolutions of the teeth, is not surpassed in plasticity and power of adaptation to successive conditions, by any tissue in the body. He shows us, by his beautiful series of developing jaws, the alveolar borders advancing and receding, the body of the jaw enlarging in depth and length, the ramus and the tuberosity moulded by successive layers of deposit or removal, with all the precision and readiness which we have been accustomed to attribute to the soft tissues only. And with this knowledge of the mobility of bone, we can easily understand what were before the hardest mysteries in the process of dental eruption. It will only be necessary for our purpose to follow the steps of the permanent teeth from the time they begin to tend toward the surface, until they are fairly established in their normal position.

It is by no pressure of the growing tooth that the absorption of its predecessor is caused, for there often exists a thin bony wall dividing the sockets of the two; and this wall continues in advance of the progressing permanent tooth, until the fall of the deciduous, being of course continually absorbed on one side

and extended on the other. The milk-tooth, meanwhile, is gradually removed by the absorbent function of a special organ developed in contact with its root, and seeming to be, at least in its later stages, only a modification of the deciduous pulp. This removal of hard by soft tissue is entirely analogous to that enlargement and replacement of Haversian canals in the substance of bones, which the investigations of Tomes have shown to be part of the normal activity of osseous tissue.

While the way is thus gradually cleared, the crown and neck of the permanent tooth, (the only parts yet formed), are enclosed in a chamber with bony walls, having substantially the same outline, and scarcely larger than will accommodate the tooth. The bottom of this chamber is formed of bone, and between it and the cap of dentine and enamel lies the pulp, highly vascular and rapidly developing. Much ingenuity has been expended in trying to guess by what mysterious force the tooth was thrust out of its crypt, as well as how it was guided to its destined place; but we now recognize that the whole process is accomplished by the simple growth of the pulp, carrying before it its armor-clad extremity. Nor is this motion so rapid as is sometimes imagined; for the shrinking of the gum after the fall of the deciduous tooth, accounts for the apparent growth during the first few days, and the subsequent elongation is far less speedy than some instances of simple growth with which we are familiar.

The passage excavated for the growing tooth in its bony surroundings, must of course be large enough for the passage of its greatest diameter, and therefore much larger than the Dental neck; accordingly, when the tooth first emerges, it is held in place only by the soft parts, so that if a jaw of this period is macerated until the bone only remains, the teeth fall entirely out of their sockets. It is at this stage that the arrangement of the Dental arch is effected. If they were merely thrust in straight lines out of their crypts, the permanent teeth would stand in one or another of those positions which we call irregular and exceptional; but while they are not yet closely embraced by the alveoli, and have no considerable length of root, they yield readily to the slightest constant forces, and move

with almost equal facility in any direction. Every one knows how the slight pressure of the fingers, when children habitually suck them, often pushes the teeth of either jaw far out of place; so a tooth on its eruption is immediately placed between the opposing pressure of the tongue within and the lips without, while it is in some degree fixed laterally by the adjoining teeth, and the limit of its extrusion, as well as its exact articulation, is determined by the antagonism of the opposing teeth. Thus there is no direction in which some pressure is not exerted upon this movable organ; and when all the conditions are healthy and normal, the Dental arch must be perfectly developed.

Mr. Tomes' researches have made plain another interesting fact. Hunter and others had declared, as the result of actual measurement, that the jaw of the child, embracing the ten deciduous teeth, had the same size in the horizontal plane, as a segment of the adult jaw containing the corresponding teeth; and yet it is perfectly obvious that the large teeth of the second set cannot be made to stand in the space occupied by their predecessors. It was said that a little was gained by the substitution of the bicuspids for the temporary molars; but the comparison of jaws in successive stages of growth has explained the whole matter in quite another way. The comparison is most easily made with the inferior maxilla; and in this Tomes finds that while the anterior segment does not alter its curve in the lower part, it increases greatly in perpendicular measurement; and this increase is gained by the growth of the alveolar border upward and outward, so that while the deciduous teeth stand perpendicularly in the body of the jaw, their permanent successors are lifted far upward and their edges thrown out until they stand at a considerable angle with the perpendicular.

In this way, of course, the second teeth are thrown into a curve much larger than that occupied by the deciduous, and yet concentric with it. No other force is necessary to explain this gradual change of position in the new teeth, than those already mentioned, the steady pressure of the growing tongue, restrained by the contrary pressure of the lips.

As soon as the teeth have emerged, the alveolar borders

which had been absorbed to give them passage, resume the process of growth, and gradually embrace the necks of the teeth in a firm and permanent support. The growth of the alveoli, however, continues, carrying the crowns of the teeth upward or downward, while the roots are developing in the contrary direction, until the full growth of both teeth and jaws is attained.

The whole range of human development hardly seems to us to afford a more notable instance of nicely adjusted forces and methods than this process by which the permanent teeth supplant the deciduous. Nor does the whole history of Dental science offer a more admirable instance of patient and ingenious research than the labors by which Mr. Tomes has brought to light this simple and beautiful evolution.

It seems proper to mention next the vital relations of the teeth. And here especially your committee find their field so narrowed by the exclusion of what belongs on the one hand to Histology, and on the other to Pathology, that but little seems left for them to say; and that little must relate rather to what yet remains to investigate, than to any attained results.

The normal nutrition of adult teeth, in both its method and its extent, is a subject of great interest, and yet very difficult to explore. A few points are certainly established. The pulp retains throughout its life the power of resuming the formation of dentine, which is its original function. Magitot represents this as a regular occurrence in teeth which are retained until old age; but teeth are certainly extracted from elderly people, which show no progress toward solidification of the pulp, and we are therefore inclined to regard the formation of secondary dentine as always the result of irritation acting upon the pulp. This point, however, requires further investigation.

The common consent of Dentists has pretty well established the opinion that a gradual process of consolidation goes on in the dentine from childhood to age. Certainly we find the teeth of old persons harder than those of the young. It may be suggested, it is true, that only the teeth of denser structure are capable of remaining in the mouth until old age, and that this is the reason why the young alone present soft teeth to our notice; but we think the observation of the profession in general

indicates a slow hardening of the teeth in the same mouths from year to year. We know beyond all doubt that this takes place locally as a result of disease. Tomes and others have pointed out what Magitot so well calls the "cone of resistance," formed by the consolidation of the dentine in front of advancing decay. The writer has established in another way the fact of a deposit of new earthy matter in these cases; for he has found that the results of many examinations give a variable but almost unfailing increase of specific gravity in the dentine between the decay and the pulp, as compared with healthy dentine from the same tooth.

These Pathological results show that the organism of the tooth has the capacity of depositing new matter in the dentine; and the normal increase in density of the osseous system, as age advances, affords a fair analogy from which we may argue the same process in the tooth.

After all, it must be confessed that we need a thorough examination of this point. A careful test of the specific gravity, the chemical composition, and the microscopical appearance of large numbers of teeth from persons of all ages, seems the only way of definitely deciding that there does exist a progressive solidification of the dentine through life, and what is its rate of advance. The investigation might be further extended by inquiring whether the dentine is subject to that perpetual renewal of substance which is the general law of animal bodies; or whether it approaches nearer in this respect to the law of vegetable structure, which grows by the simple addition of new matter. The old experiment of coloring the food with madder and afterwards seeking the coloring matter in the teeth, is clumsy and unsatisfactory as a test for the deposit of new matter; but the recent discovery of the spectrum analysis has been most ingeniously applied to determine this point in other tissues, by Dr. H. Bence Jones. It will be remembered that this method detects the presence in the fumes of burning substances, of many elementary bodies in extremely minute quantities. The following is part of the account given of those interesting experiments.

"When half a grain of chloride of lithium was given to

a guinea-pig for three successive days, lithium appeared in every tissue of the body, even cartilages, the cornea, and the crystalline lens. Two animals of the same size and age were taken; to one was given three grains of the chloride of lithium, and it was killed in eight hours. The other had no lithium; it was also killed, and when the whole crystalline lens was burned, no trace of lithium could be found. In the other which had taken lithium, a piece of the lens one-twentieth of a pin's head in size, showed the lithium; it had penetrated to the centre of the lens."

Now, when we remember that the crystalline lens is quite as destitute of capillaries as the dentine, it seems fair to infer that an examination of this tissue might also have shown the presence of lithium. We suggest that a series of experiments like those recited above, but directed to the Dental tissues, would go far to determine the existence and the degree of that vital activity which they doubtless possess.

What part or parts of the Dentine, microscopically considered, are the seat of this new deposition, whether greater solidity is obtained by the contraction of the tubules or by interstitial growth of the intertubular structure, is a question that belongs to the histologist rather than the physiologist, when those offices are divided.

The vital relations of the teeth to other parts of the system, are obvious and important in pathological conditions, but in a state of health they are extremely obscure. The abundant innervation and vascularity of the pulp, go far to indicate that it is a seat of great vital activity, and might add another argument to those named for believing in the constant nutrition of the dentine. But while the physiologist cannot forbear to seek some functional connection sustained by all this supply of nerve-filaments, he is forced to confess that hitherto none has been discovered in activity during perfect health. Possibly a careful and minute examination of all the morbid phenomena displayed by the Dental nerves, might lead to a deduction concerning their healthy functions, and in this way point out the direction for future inquiry. But nothing of this kind has been attempted, so far as we are informed. Your committee, therefore, has to

content itself with indicating this as another and very obscure field for future investigations.

The mechanical functions of the teeth are more easily examined, and are therefore much more familiarly known. Except the anterior extremity, there is no part of the system common to the vertebrata, which assumes so many forms and fulfills so many different purposes in various animals, as do the teeth. And when the comparative anatomist surveys their endless shapes and uses, he must feel that in man they are singularly limited in function; for of all the ends which they elsewhere subserve, we find here only that of mastication. There is imposed, however, upon the human teeth a duty quite unknown in any other animals that of taking part in speech; and the consideration of these two functions will occupy what remains of the present report.

In the inferior animals we find the widest difference in the act of mastication, according to the nature of their food. Carnivorous animals scarcely chew at all. Many of the lower orders swallow their prey whole and alive; while the highest are content with simply tearing the flesh and bruising the bones of their victims, without any attempt at a further subdivision than is necessary for swallowing. On the other hand, those animals which feed on vegetables carry the process to the highest conceivable point. Especially the ruminating animals grind their food until it is reduced to the minutest particles. Now man, occupying a position between these two extremes, shows both by the conformation of his teeth and the results of multiplied experience, that he neither must swallow his food unchewed nor can reduce it by simple mastication to the finest subdivision. The aid of culinary art does much to prepare the food we eat for digestion; both by giving it that improved taste which is found to promote the digestive process, and by loosening the connection of its particles.

The methods of cookery which are most conformable to a sound physiology, and therefore most conducive to health, have scarcely formed the subject of any scientific research; and yet no field of inquiry is more important or more easily cultivated. So long as the pleasure of the palate is the only guide, we shall

suffer the penalties of self-indulgence; but when physiologists can bring themselves to ask not only what is the proper food for men in various conditions, but what is the style of cookery which most fully attains the rational ends of cooking, we shall have taken a long stride towards the primary conditions of perfect health.

When, however, the artificial preparation of food is complete, it is still very important that the duty of the teeth be well performed. The instances of health recovered or improved by the restoration of the masticating powers, are frequent and striking; and probably multitudes of confirmed dyspeptics owe all their misery to the habit or the necessity of imperfectly performing this function. Exactly what is the result of mastication on the food, physiologists are not fully agreed. It was formerly asserted that the office of the saliva was to change starch into sugar, and that the incorporation of the buccal fluid with the food by chewing, was intended mainly to accomplish this. But it is now certain that this change cannot be detected in amylaceous food which has passed into the stomach, the gastric juice entirely preventing such a reaction; and it would therefore seem that we have to do here with a process entirely mechanical. Still, it is not difficult to see that the intimate mixture of the food with the saliva, while it facilitates deglutition also prepares the mass to be readily penetrated by the digestive fluids of the stomach and the small intestine. And if this be the object of chewing, of course the process should continue with each morsel until the whole is reduced to a uniform pulpy mass, instead of being simply bruised and swallowed as it so generally is.

In mastication the teeth are the only efficient agents; but in speech they merely co operate in various degrees with the organs of the mouth, the throat, and the chest. Nor is it very easy to determine exactly what share the teeth have in the result. Many persons who have lost one or several teeth, some who have lost the entire Dental arch, learn to speak with the same distinctness as before the loss; so that we must conclude that the Dental part of articulation is not essential, but may be supplied by other organs. If we examine the formation of the simple sounds, we reach the same conclusion. The vowel-sounds be-

ing formed in the larynx, do not require any assistance from the anterior part of the mouth, and therefore do not concern the teeth. Of the consonant-sounds only two pairs make any direct use of the teeth in their formation. These are the F sounds with its modification the V-sound, and the TH-sounds. In each of these cases one sound is quite simple. (F and TH as in *think*), while the other in each pair, (V and TH as in *this*), is compounded of the corresponding simple consonant-sound and a laryngeal murmur, which is also heard in B, D, G hard, and Z, as well as all the liquid consonants. There are therefore only two simple consonant sounds, in making which the teeth are directly used; for the so-called dentals T and D are made by putting the point of the tongue *not* against the upper incisors, but against the alveolar ridge immediately behind them. Now if we examine these two sounds which have really some claim to be called Dental, we find that the teeth enter into their formation merely because they stand midway between the opening of the lips and the arch of the palate. Thus the F sound is made by setting the lower lip against the edge of the upper incisors, and exhaling forcibly; while the simple TH-sound is formed by placing the tip of the tongue lightly against the same teeth, and breathing in the same manner. But if anything else occupy the position of the teeth, the same sounds can be produced. For instance, if the upper lip be forcibly drawn over the edge of the upper incisors, the lower lip or the tongue will play against it and produce the sounds almost as perfectly as when the teeth are bare; and in the same way, when the teeth are lost, the tongue and lips generally learn to adapt themselves to the vacant alveolar ridge just as they once did to the teeth.

The conclusion from these considerations is that the teeth do not contribute to the formation of sounds either by their structure or their shape, but only by their position. And yet we conceive that they have other relations to the voice which are extremely important. The teeth, when the two arches are complete, stand as a fixed barrier between the lips and the tongue, and prevent those very flexible organs from encroaching on each other's position. Besides, the teeth hold the jaws at a certain

definite distance apart, and thus determine the space in which the tongue has to play, and the extent to which the lips compress each other. All these nice adjustments form the conditions for that perfect activity of lips and tongue on which depends the clearness of articulation.

Still another fact remains; for the contour of the lingual face of a perfect Dental arch is such as to give the waves of sound issuing from the larynx a definite forward direction, while the smoothness of their surface, and the density of their structure assist the palate in giving resonance to the voice.

To sum up all in a single description, the mouth with perfect teeth is a sonorous cavity with definite walls, in and around which the soft parts play with the utmost nicety and precision; while the toothless mouth is a loose bag, containing but a single resonant surface almost flat, and surrounded and filled by very flexible organs, which act with no fixed support, and require for the tolerable performance of their task the minutest attention and the most wearisome effort.

In concluding this paper your committee must express their regret that the material is lacking to make it either fuller or more instructive. Dental research is yet in its infancy; but the shining examples of Tomes, to which reference has been made, and the no less admirable labors of Magitot, in the field of Dental Pathology, both show what may be done, and will doubtless urge others to imitate such worthy beginnings.

J. SMITH DODGE, JR., *Chairman.*

TRICHINA SPIRALIS.

BY DR. R. W. VARNEY, NEW YORK.

Of all the entozoa now known to exist, the "Trichina Spiralis" has, within the last few years, occupied much the largest share of scientific as well as public attention. It is the cause of a severe and often fatal disease called *Trichinosis* or *Trichiniasis;* which though only recently recognized as a separate and distinct disease, has undoubtedly existed as such as long as

has the habit of eating raw or partly cooked swine flesh. Trichinosis is a disease manifesting itself in the intestines and muscular system of man; and as has already been intimated *is caused by eating pork infested by Trichina Spiralis.* I am thus emphatic in my statement that it comes from pork eating, because it is said by some "high in authority," that beef is also, at times, infested by the same. But it has thus far been found impossible to reproduce them in the beef by artificial feeding. The same remark holds good for fowls also. So that, although readily developed in the cat, rabbit and rat, *practically* man's chances of becoming trichinized are confined to pork.

It may not be amiss to state in this connection, that trichinized pork is entirely distinct from so called measly pork. The latter being the encysted stage (cysticercus cellulosa) of the "Tenia Solium" or common tape-worm found in the intestines of man. Such pork being taken into the stomach, imperfectly cooked, the little *cysts* or *scolices* as they are often called, are set free by the act of digestion. At this period of their development they consist of a loose globular sac, in the interior of which is another sac, filled with serous fluid. At one point on the surface of this inner sac is a puckered depression, which is the opening to a long narrow canal formed by the involution of a part of its wall. At the extremity of this canal is the head of the future *tenia* provided with hooks and suckers, and supported on a slender neck. When its head is freed by the eversion of that portion of the sac forming the canal, it attaches itself by means of its hooks to the intestinal wall, where it developes into the mature tape-worm; the body of which consists of joints or articulations. Those first formed and consequently oldest, being farthest from the head. These joints or *proglottides* containing the male and female organs of generation complete, are given off at maturity, and escape from the intestines of its host, to perhaps find lodgement in the alimentary canal of another hog.

At this time the ova contain partly developed embryos, which are set free during digestion, to make their way into the tissues of this their second host, there to be converted into cysts or scolices thus constituting measly pork.

Trichina Spiralis, however, does not belong to this order of encysted worms (cestoidea), but to that of thread worms (nematoidea). The pine worm serving as a good example. Its development also is less complicated, than that of the tape-worm. When trichinous pork is microscopically examined its muscular tissue is found to be thickly studded with small ovate cysts or capsules varying in size from 1-60th to 1-40th of an inch in length, and 1-90th to 1-70th of an inch in thickness. It is said that upwards of thirty thousand of these have been found in one cubic inch of muscle. Occupying the interior of these capsules are the mischievous lodgers spirally coiled sometimes, though oftener irregularly twisted upon themselves. After the worm is carefully removed from its envelope it measures about 1-20th of an inch in length, and 1-600th of an inch thick. If pork, thus inhabited, be eaten by man in an imperfectly cooked condition the trichinæ are set free—their capsules being dissolved during digestion—when they soon lose their coiled form. Increasing rapidly in size they attain to sexual maturity in a few days, and are about equally divided as to numbers in each sex, though the females are considerably the largest in size. After fecundation occurs, the males soon disappear so that at the end of two weeks they are all gone. The embryos are sufficiently developed at the end of a week or less sometimes, to commence leaving the ovisac, at which time they appear as minute transparent worms. Some four or five hundred are thus discharged, by each individual female, the time required being five or six weeks, as they are developed in successive broods. When they begin escaping from the parent, the first symptoms arise, indicative of their presence, such as nausea, anorexia and intestinal irritation.

When the diarrhœa is severe during this, the early stage of the disease, the succeeding symptoms are much lighter, as not only are large numbers of the young worms thus got rid of, but also many of the mature ones, before they have had time to give out many broods. Otherwise the young worms immediately leave the interior of the alimentary canal by penetrating its walls, and so traversing the areolar tissue, reach and enter nearly every portion of the muscles. During their *migrations* are ex-

hibited the *worst* symptoms of trichinosis, fever, ædema of the face, extreme pain attending muscular action, and great tenderness of muscles to pressure, debility and death. If the number of worms is not too great, and the patient's strength enables him to hold out until they cease their wanderings and become encapsuled, recovery supervenes and no more trouble comes of their presence, though they may remain alive for many years. And at the death of their host, if taken into the stomach of man, hog or other animal susceptible of being trichinized become mature in their turn, to give off broods of embryos, which shall go the rounds just described. The time required for them to become encapsuled, and so quiescent, varies somewhat.

Their wanderings begin immediately after birth, but as it usually takes five or six weeks for the successive broods to be developed and discharged, it must of necessity take a little longer time than that for the younger ones to reach their resting places.

The author of one of our text books on physiology speaks of their entering the circulation and being arrested in the capillaries supplying muscular tissue, acting as emboli and finally becoming encysted. Other high authorities state that after traversing the areolar tissue, they penetrate the primitive bundles of muscles, devouring its substance, and finally becoming encysted.

I hold that neither view is correct. Their final habitations in the muscles are *extra-capillary* and *inter-bundular* instead of *intra-bundular*. Frequently, after a time their capsules become cretaceous, thus causing the muscles to present an appearance as if sprinkled with a light colored sand.

After its having been established that the origin of the disease in man is in pork eating, attention was turned toward ascertaining the origin of it in the hog. In a report offered by the committee appointed by the Imperial Society of Physicians, of Vienna, it is stated, that the rat is the source from which it is unwittingly obtained by the hog. The committee also substantiates the results of previous experiments, as to the transmissibility of the disease, from the rat to the cat, rabbit and hog, by artificial feeding. But as has already been stated in this paper,

the source of the disease in man is practically confined to eating the raw or partly cooked flesh of the latter. And unfortunately (for humanity) their presence in swine produces no symptoms by which it can be detected. Neither does their flesh present any unusual appearance unless minutely examined, when that sanded appearance previously spoken of, will be seen. A *microscopic* examination is much the safest, as a more thorough search, can of course be made thus. *And that examination should not be confined to the muscles of one locality*, though in ham the trichina are usually found in the greatest number about the leg. The parasite seems to prefer locating in the muscles nearest their attachments, though they are often very unevenly distributed, so that an examination to be reliable should extend to at least a half dozen different localities.

One of the latest recorded cases of the disease in Prussia, was occasioned by eating pork that had passed the governmental examination. But upon subsequent inquiry it was ascertained that only one small portion of the shoulder was sent to the examiners, and that other portions of the animal were profusely infested. Each of the two great epidemics in Germany, was caused by eating the flesh of one single hog, and the combined results of the two, was the *sickness* of between five and six hundred persons, and the *deaths* of over one hundred of the number. The showings of the committee of the "Chicago Academy of Science" are to the effect that the disease prevails much more extensively among the swine at the West, than is shown to be the case in Germany. Fortunately, the habit of eating raw pork is little practiced in this country; and *as thorough cooking destroys the parasite, it should be carefully and completely performed, before any degree of safety can be assured the consumer.*

REPORT ON MECHANICAL DENTISTRY.

THE Committee on Mechanical Dentistry make the following report:

Since the last meeting of this Association, the methods and

practices in use by the profession at large are substantially in accordance with previous reports. No inventions or discoveries have been made which have been sufficiently tested to warrant their general adoption. The profession has been promised in the public journals important improvements in the use of aluminum as a base for artificial teeth, but the committee have no personal knowledge of the value of this material, and have been unable to obtain from gentlemen prominently connected with these experiments, such information as would justify us in reporting favorably upon the subject.

It is also a matter of rumor that a substance has been discovered, or a combination invented which is destined to supplant the use of vulcanized rubber in Dentistry. A communication addressed to the discoverer, by the committee, is unanswered, and thus no definite report can be made.

The profession as a whole, seem to have been contented with gold, silver, platinum, and vulcanized rubber, used substantially as heretofore.

There has been some improvement in dentures upon rubber base, but the credit is chiefly due to manufacturers of teeth, who have, by increasing their variety of forms and color, contributed to this end.

While your committee cannot report any great invention or improvement, they feel it incumbent upon them to direct the attention of the Association to the very prevalent apathy in regard to the requirements of this department. While the utilitarian purpose of an artificial denture is undoubtedly of the first importance, its influence on the appearance of the wearer, and the articulation of the voice, should claim the earnest effort of the Dentist. In this respect the profession as a whole, have not made the best use of the facilities offered.

The *mechanical* excellence has altogether taken precedence of the artistic, and artificial dentures which may be very serviceable, but which are more or less a deformity in appearance, are very common.

The ease with which vulcanized rubber can be manipulated by unskilled hands has contributed materially to this result, and the difficulties also with the teeth, made for this class of work,

render it difficult to arrive at artistic excellence. In this respect the continuous gum work on platinum presents advantages that are not fully appreciated by the profession, and your committee would respectfully submit that in their opinion for full sets this style of work with the present facilities for constructing it, is the highest attainment in artificial dentures to which our profession have yet arrived.

We would not forget, however, and would heartily recommend the very excellent style of work made by using a gold plate, and attaching the teeth thereto by means of rubber, the teeth being previously arranged and adapted in the same manner as for continuous gum work.

We would further call your attention to a style of work known as the Porcelain Base, presented by Dr. Dunn, of Delaware, which, with its present improvements, promises to a great extent, at least, to supercede rubber for full sets.

Improvements are still being made by our manufacturers of artificial teeth, which render them more life like, and better adapted to restore the natural expression of the mouth.

All of which is respectfully submitted.

I A. SALMON,
CORYDON PALMER, } *Committee.*

A SYNOPSIS OF REMARKS AND DISCUSSIONS OF THE AMERICAN DENTAL ASSOCIATION.

SEVENTH ANNUAL MEETING.

After calling the meeting to order, the President, Dr. C. P. Fitch, of New York, remarked that he was very much pleased to see so many members present, and especially to see them so promptly present. He hoped, however, that many more would yet arrive to take part in our deliberations and discussions, and that this meeting would be characterized by harmony and the most cordial brotherly feeling, and result in greatly promoting the cause of science, and the elevation of our profession.

By invitation of the President, the Rev. H. D. Moore, of

Cincinnati, led in prayer, asking the blessing of God on the prospective labors of the Association, and on all the members.

Prof. James Taylor, in behalf of the various local societies of the West, delivered a cordial address of welcome, as follows:

Mr. President and Gentlemen of the American Dental Association:

The very pleasant duty of welcoming you to the Queen City of the West has been assigned to me. We congregate in the same hall in which the American Medical Association so recently held their deliberations.

It is a matter of no surprise to us, and yet of some congratulation, that the subject of medical specialties has assumed with this conservative body some importance. It depends very much on the Dentist, the oculist, and the *specialty* of general operative surgery, what shall be the status and true progress of medical science in the United States.

In looking back over the rapid progress of Dental science for the last thirty years, we feel assured that there is no danger of our being absorbed by the mother of us all, but that the great law of nature will hold good here as well as elsewhere, and that youth, with a good germ of life, will soon outgrow or at least overtake maturity.

In looking over the curriculum of our Dental colleges, we are rather disposed to think we shall soon absorb or lay under contribution every department of medical science. We love, venerate, and cherish the time-honored profession of medicine. It has embraced for ages a vast array of talent. The learned, the great, and good are, from year to year, adding fresh lustre to her renown. A more noble, self-sacrificing class of men can nowhere be found, and the more we emulate these noble qualities, and the more of her true science we obtain, the higher we shall place the standard of our specialty.

Mr. President and gentlemen, allow me to revert to the past twenty-five years. We claimed for this city some sixty thousand inhabitants, a little over thirty years since, and this great Western Valley could claim only a half dozen or little more Dental practitioners. Let me name a Ratre, a Somerby, a Put-

nam, a Parmly, a Ward, a Hale, and a Rogers. A little over twenty years since and a few of us here, in this city, met together and organized the now oldest Dental association, perhaps, in the world, a still young and progressive society. I know not, Mr. President, but that I may have been selected on this occasion, because I am considered one of the links connecting the present with the past, one of the pioneers of this Western development, not quite yet fossilized. Let this be as it may, we still urge on the car of Dental science, rejoicing at every new advance obtained.

What a change, Mr. President, twenty years have wrought! When I look around upon this assemblage and see delegates from associations scattered all over our great country; when State, city, and county associations are sending up delegates by the hundred, and four or five colleges are represented, I try to make myself believe that I am growing old; but this is not the case, for others around me, who are my seniors, look young, and I know it is not so much age as vigorous development which has done all this. We are not old, Mr. President. We are yet being developed.

This Association is an organ of our professional body, whose function is the development of Dental science. Let us nourish it with so rich a diet that the eliminating organs shall rear a structure enduring as time, built on the solid foundations of immutable truth.

Having this hope, and looking to this end, we now, in behalf of the Mississippi Valley Association, the Ohio Dental College Association, the Cincinnati Association, and such other societies as rejoice in your presence, bid you a hearty and cordial welcome.

We would, Mr. President, through you, extend the right hand of fellowship to all who rejoice in the prosperity of our profession, and who may visit our city on this occasion.

The address was received with hearty applause, and referred to the Committee on Publication.

After the transaction of several items of miscellaneous business, and the election of officers for the ensuing year having taken place, the President appointed Drs. Spalding and McKel-

lops to conduct the President elect to the chair. On being introduced by a few elegant and appropriate remarks by the committee, the President elect made a brief and eloquent extempore address, of which the following is but a defective synopsis:

GENTLEMEN OF THE ASSOCIATION:—In assuming a position so important, and at the same time so unexpected, I would be untrue to myself not to give some expression of thanks for the honor conferred. And while I regret that one of more executive talent, and more experience, has not been elected, I promise to discharge the duties of the office to the best of my ability, in all fairness and candor, and without regard to persons or circumstances. Relying on your concurrence, and believing that I shall have your support, and the efficient aid and assistance of those elected by you to co-operate with me, I hope to discharge the duties you have called me to in such a way as will promote the great end for which we are assembled.

DENTAL CHEMISTRY.

The report of the Committee on Dental Chemistry was read by Dr. Lawrence.

Dr. Buckingham said he could heartily indorse all that the paper contained. Very few, perhaps not one in ten of the profession, understand the composition of the human body, and of course, know but little as to how it is to be nourished properly. The science of chemistry is neglected in our schools, even in our high schools and colleges, while a knowledge of it is necessary to the faithful discharge of the duties of every department in life. As an illustration, no one needs it more than the cook. While it is the science by which mysteries are solved and explained throughout the physical world, it is regarded by all as a dry study, and is therefore almost ignored.

Dr. Kennicott said if an amendment to the report was admissible at this stage, he would like to have added to it, "as a codicil," Dr. S. S White's remarks on sunshine as a hygienic agent, made at the last meeting of the Mississippi Valley Association, and published in the DENTAL REGISTER.

Dr. White being repeatedly called for, stated that he under-

stood too well what a compliment was thus offered not to rise, but he was not ready to say anything at present.

Dr. Watt said he felt like opposing somebody or something, and as a little antagonism was often necessary to insure earnestness, he believed he would take issue with the statement that chemistry is regarded by all as a dry study. He saw before him the countenances of several brethren who have not so found it. He never had cause to complain of his classes neglecting this study on account of its dryness, or for any other cause. He had always found them as willing to study chemistry as operative or mechanical Dentistry. And he believed it would be impossible for any one, even a mule, to regard chemistry as dry, after he understood the laws of affinity, and the doctrine of chemical equivalents. He regarded this as having a wider range than any other science, and as more important than any other.

Dr. Barker said we must not forget that there are other sciences besides chemistry. That the evils of defective or perverted nutrition may be overcome, we must know when to eat, what to eat, and how to eat.

Dr. Atkinson said all other sciences are as important as chemistry. He asked what are the unitary conditions of a body, and answered, centre, surface, and matter. He referred to the body, soul, and spirit, and said that, of the three, the latter is most interior, and, even when considering the most material, we are grappling with "the things around the throne." He would enter his caveat against the exaltation of this science above all our other knowledge, and remind those taking such positions that science is far short of inspiration.

Dr. Spalding said that we view this science, as we do other things, from different standpoints. He regarded different views as necessary to the advancement of our best interests, and that is why we gain so much by coming together. He spoke of three kingdoms in nature—the mineral, vegetable, and animal; and he claimed that chemistry proper—chemical force as such—pertains mainly to the first mentioned. In the other kingdoms other principles govern; but it should be borne in mind that all these forces are correlative. One may be changed into another;

but after the *change*, it is not the same. For example, if chemical force is changed into electricity, it is no longer chemical force; and when light is changed into heat, it is no longer light. A simple and familiar experiment may illustrate and demonstrate this change: If pieces of cloth, of similar texture and thickness, but differing in color, be laid on the surface of snow exposed to sunshine, the snow will melt more rapidly under the black than under the white cloth, though it is evident that equal quantities of light and heat fall on equal surfaces of both. The different results are to be explained on the principle that a portion of the light falling on the black cloth is changed into heat. He did not regard nerve force as an exception to the law of correlation.

Dr. Fitch said these things are interesting mainly because we do not understand them. He regarded the mineral kingdom as the proper field for the manifestation of chemical force. In this the experiments are highly interesting; but of the laws of combination, we know absolutely nothing. The most interesting department of this science is vital chemistry. He would like to have the data or law governing the action of the stomach.

Dr. Walker alluded to the want of ventilation in the hall as a violation of chemical laws.

Dr. Rogers was struck with the remark, in the report, that we give the best of our chief article of food to the pigs. The food of the mother, during the periods of gestation and nursing, he regarded as very important, and believed the matter was too little thought of. He referred to horizontal lines, or grooves on teeth, as sometimes found, and regarded them as evidences of defective nutrition during the formative periods of the teeth.

SECOND DAY—AFTERNOON SESSION.

There having been some difference of opinion expressed in reference to the disposition to be made of the Transactions of the Association, a special committee was appointed to consider the subject and report as soon as practicable. Accordingly they reported, that the committee had conferred with the proprietors of the DENTAL REGISTER and DENTAL COSMOS, and

those gentlemen had generously offered to publish all the discussions and written papers presented to the Association, in their respective journals, free of charge, and they recommended that the offer be accepted.

Dr. Spalding, on the motion to adopt the report, said he was opposed to going backward; he was decidedly in favor of continuing the publication of the proceedings in separate volumes.

Dr. Taft coincided with the views of Dr. Spalding. The recommendation to publish the transactions of this body in the fugitive pages of monthly journals, was certainly not the best way to preserve them for future reference. If no better way was proposed, he would be willing to publish the transactions in a separate volume, at his own expense, and depend on the sale of them for his compensation.

Dr. Wetherbee thought if the transactions were worthy of publication at all, they were worth publishing in their proper form.

Dr. Watt alluded to the fact that at the second meeting of the Association, owing to the distractions caused by the war, but a very few members were present. These few met the crisis with a courage worthy of the cause, and saved the life of the Association. They resolved to publish the transactions in a separate volume, to have it secured by copyright, and to restrict its sale to members of Dental societies. This resulted in the rapid formation of local societies, and the result was a large meeting the next year. If the few members at that meeting could take such responsibility, he thought the Association, now so strong in numbers, could well afford to publish its own proceedings, especially when there was no longer a necessity for restricting the sale of them. And, besides, the journals would be as well filled without these transactions as with them.

The report was finally recommitted.

The President announced that the discussion of the report on Dental Chemistry was again in order.

Dr. Watt said there appeared to be a want of clearness of idea on the part of some as to what chemistry is. He alluded to the fact that several members had proposed to name something more important than chemistry, and, in endeavoring to do

so, had set forth an array of chemical statements or questions. For example, we had been told that the questions "what to eat, when to eat, and how to eat" were more important than any chemical questions, when, in truth, these are strictly chemical, no other science being at all able to answer them. Nothing, he thought, could be much better recognized than the fact that our bodies are built up and nourished in strict obedience to chemical law. Again, it had been suggested—or nearly so—that chemistry proper is restricted to the inorganic Kingdom of Nature; that when matter is organized it is governed by vital, and not chemical force—that the latter is changed to the former on the principle of correlation; but such position does not appear to be tenable. Chemistry is by no means so restricted. All the matter in the universe is governed by its laws, which are uniform in their action under perfect similarity of circumstances. In the inorganic kingdom, chemical action is modified by a variety of circumstances, such as cohesion, volatility, electric action, etc.; and when brought from this to the organic kingdom, it meets with vitality or vital force, as another modifier; yet, all the time, this force, sometimes called affinity, is true to its own nature, obeying the laws by which it is governed under whatever circumstances may be present. The only knowledge having a wider range than this science is *omniscience*. It is true that *chemical action* is restricted by the boundaries of matter; but *chemical science* is not so bounded; it goes away beyond, to the utmost limits of space, to inquire if there is *matter* there; and only it and omniscience are able to answer the question.

Dr. Barker stated that two children might be fed at the same table, on the same kinds of food, in equal quantities, and yet the one may be fat and healthy, while the other is lean and languishing. The chemical materials of the food are the same in the two cases, while the results are widely different.

Dr. Spalding claimed that the chemical is the governing force in the inorganic kingdom; but that matter belonging to the vegetable and animal kingdoms is controlled by a superior force —the *vital*, and in the animal, the *nerve* force; and he did not regard the latter as an exception to the law of correlation; but

though it may once have been chemical force, it is a higher grade of force now. He thought chemical force, as manifested in the mineral kingdom, had no place here, but had given place to a higher manifestation of force.

Dr. Watt stated that a proof that chemical force acts, *as such*, in the organic kingdom, is afforded by the fact of definite combination. The law of chemical equivalents is the fundamental principle of chemical science; and this, he said, was manifested in both the vegetable and animal portions of the organic kingdom. He illustrated this by the combination of albumen with nitrate of silver. He said the proportions were the same, whether the albumen came from the vegetable or animal kingdom, and the same whether it was living or dead.

Dr. Atkinson asked, What do you mean by dead albumen?

Dr. Watt said that when albumen had no organic connection with a living organized body, he regarded it as dead; and, in illustration, he referred to certain morbid conditions of the system, in which albumen is thrown off, as excrementitious matter, with the urine. Then he regarded it as dead; but when constituting a portion of the blood or muscle of a living being, he regarded it as alive. He said this might not be a very technical definition; but he did not care, if he was only understood.

Dr. Atkinson responded, "But you must care; we want correct definitions." He said albumen that is dead is not albumen. He illustrated his idea of the essence of life by referring to silex. It is composed of silicon and oxygen—elements which are not alive; but when they combine, the result is a quartz crystal, and that is alive. The great error of the report, and of the preceding remarks, he said, consisted in assuming that a part is greater than the whole. Human life had three distinct departments, conscious life, systemic life, and molecular life. The whole difficulty, he said, had risen from a too high estimate of our own knowledge. He inquired, what is knowledge? And, after lecturing the Association a little for not answering, like schoolboys in concert, he defined it to be "an overpowering perception of the truth." He stated that all things differ but in degree; and that human life includes all of chemistry, as once there was but one human being on this planet, and that

one the planet itself. Chemistry crystallizes that which has been broken down, of previous formations, and from their *debris* gives higher organizations; as when the mineral kingdom was half completed, the lower half of the vegetable came, as a correlation of the mineral. Then, when the vegetable kingdom was half complete, the animal came, it being then about ten o'clock on the dial of creation, at the noon of which, a supernal will came. He maintained that there is but one force in the universe, and that segregations of this same force, in minus quantity, constitute all else that is called force. And the conclusion of all is, that centre, surface and substance include all of existence.

Dr. Chase thought some of the speakers had spoken ambiguously in using the term "mineral" when they meant inorganic. Oxygen, nitrogen, etc., he said, could not with propriety be called minerals, yet they belong to the inorganic kingdom.

Dr. Buckingham stated that chemistry investigates the laws of matter, first in its elements, and then in compounds. By the manifestations of chemical force, we recognize the difference between elements and compounds. He illustrated the subject by the uses of letters. Each letter has its own peculiar character; and, by combining these peculiarities, words are formed. The elemental characteristics of the letters are, for the time, lost in the word. So each atom of matter has a property peculiar to itself; and it never loses this except by combination. We regard oxygen in accordance with and recognize it by its properties; so also of hydrogen; but when they are united, we think not of the elements, but of the liquid water. And the figure is still good. We may read the details of a serious accident, and never think of the letters or separate types used in printing them, but only of the facts detailed. The elements of matter and chemical force are alike indestructible. Now, chemistry teaches the nature of this force rather than of the matter acted on by it; and this force is always persistent, and chemistry teaches, as well, that matter cannot be changed into anything else.

Dr. Spalding thought that this would be clearer by bearing in mind that forces are changed into each other When affinity is changed to mechanical force, it is no longer affinity.

Dr. Taft would like to ask Dr. Spalding a little about this correlation of forces. He was not clear about the different colored cloths on snow, as referred to last evening. Might it not be that the difference resulted from the different reflecting and absorbing powers of the different colors?

Dr. Spalding was happy to explain. He said we must take the testimony of competent experimenters; and they tell us that the reflection and absorption of heat are not in the least affected by color. The difference in light and heat, he said, was only in the character of the motion. By changing the motion the results are changed.

Dr Judd said that the position of Dr. Spalding was corroborated by placing the different colored cloths in ice instead of on snow.

Dr. Buckingham claimed that color does affect reflection and absorption. He illustrated his point by an analysis of the solar spectrum, and a reference to red heat, stating that by increased rapidity of motion, heat is changed to light.

DENTAL PATHOLOGY AND SURGERY.

The report of the committee was read by Dr. Atkinson, as published in this volume of transactions.

Dr. Taft hoped this subject would not be lightly passed over. He would much prefer to hear principles discussed, yet would listen cheerfully to details of cases; but when principles are clearly laid down, details come easy.

Dr. Judd said he always desired to base theory on fact. Some things in the paper he did not know whether to regard as facts, or merely theories, as, for instance, the statement that the periosteum is not *the* bone producer. We must know how this conclusion has been arrived at before we are ready to give it a place among the established facts of science.

Dr. Atkinson replied that the statement goes back, in his observation and experience, to 1837. He was able to show that each tissue is evolved from specific cells—from cells peculiar to itself. That the periosteum, instead of being the bone maker only defines or limits the proliferous cells. If there is something besides its own essential tissue connected with the perios-

teum, the case is different. He could show cases of reformed bone that would illustrate what is meant by the action of osteoplastic cells. In these osteoplasts the lime salts are deposited. When the periosteum is torn from bone, a number of these osteoplasts are torn off with it, and hence bone is reproduced, in connection with, but not by the periosteum. A complete member (as a lower jaw) is sometimes formed, and sometimes not, in these reproductions. Facts are nothing when principles come along! Facts are but the outcropping of principles. To illustrate the point: if we receive a present of money by express, will we thank the last office, or the sender? The principle is the sender; the fact is simply one of the offices through which the blessing has come.

Now, in the removal of necrosed bone, with the hope of reproduction, some practical points are worthy of careful attention. A watery solution of chloride of zinc, about 20 grains to the ounce, should be injected into the wound. It will stop slight bleeding, and form a colloid mass; and if this mass is large enough to form a pocket for the new formation, no more dressing is needed for that day. As a hint at what may be done in this direction, he stated that he had seen the upper jaw and palatal bones reproduced, and there was nothing in the external appearance of the parts to indicate other than the normal conditions as to form and texture. In the reformation of alveolar processes, he used to dislike the extremely thickened appearance they presented, but he found they were easily thinned down by pressure.

SECOND DAY—EVENING SESSION.

Met at 8 o'clock, and resumed the consideration of Pathology and Surgery.

Dr. Chase said it was important to keep clearly before the mind the difference between physiology and pathology, though it was difficult in some cases to draw the exact line of distinction. When bone is produced where it is not wanted, the action is regarded as pathological; if where it is wanted, it is called physiological action. Inflammation might be called an excess of vital action. He disagreed with Dr. Atkinson as to the

position that bone cannot be produced except when there are pre-existent osteoplastic cells. Take, for illustration, the egg. The germinal cell there is a simple cell. You do not find a specific osteoplast or bone cell, nor a specific feather cell, but all these tissues are developed from the simple cell. There is a ghost there! He knew what Dr. A. meant by his ghost theory, and he agreed with it—that there is a presiding power, which is capable of producing, from this primary or typical cell, all the varieties known to physiology.

Dr. Watt said he thought mistakes had been made, both by physiologists and pathologists, in showing more deference and respect to the periosteum than it was entitled to. It had been maintained by many that, in order to the reproduction of bone, the periosteum of the lost bone must have been preserved; but this was certainly not necessary in all cases. It would appear strange when nature can reproduce so many other tissues, that she must fail on the periosteum, which is certainly not very complex or peculiar. He believed that patients often failed to obtain the best that surgery can give them, on account of this mistaken theory having such a strong hold on the minds of the profession. Feeling thus, and believing that the absence of the periosteum should not result in the absence or loss of all hope, he had recently performed an operation, which, perhaps, was not warranted by the books.

Three and a half weeks ago, a young man called on him, having lost three of his upper incisors by a blow. The lips and gums were bruised and swollen. The lingual wall of the socket of one of the centrals was broken inward, and quite loose. It was now 7½ P. M., and the teeth had been knocked out at 4½. Then he had only the centrals with him, and they were, to all appearance, perfectly dry. All adherent portions of periosteum were removed from the teeth with a bone knife, so as not to cut or abrade the cementum, the sockets were washed out with tepid water, and the two centrals were reinserted and temporarily retained while the patient went in search of the lost lateral He found it, and at 9½ P. M., five hours after it had been knocked out, it was replaced, and a compress of gutta percha was so adjusted as to hold all three in their proper po-

sitions. The compress was worn till 10 o'clock next day, when it was removed for the purpose of taking nourishment, and to cleanse it. It was replaced, and worn most of the time till the next morning, when it was abandoned. The case was closely watched, both local and constitutional treatment being used as indicated, and to-day, as several of the members present can testify, the teeth are adherent and comfortable, one of them being nearly if not quite as firmly attached as ever. The attachment at the lingual surface of the neck of the tooth in the fractured socket is not yet perfect, but the improvement is very rapid even here. The lateral, which was out five hours, is adherent throughout the socket.

A member inquired if the pulps were removed before replacing the teeth, to which Dr. W. answered, no.

He was asked if he expected the pulps to re-establish their vital connection with the system. He answered that he had just faith enough in the principle to induce him to give nature a chance to do her best. He referred to two cases of replanted teeth that came under his observation. One of the teeth was reinserted by Dr. Taft in 1843, a few minutes after extraction. He had opportunity to watch that tooth up to about 1862, at which time it was, to all appearance, a perfect tooth, and by testing with a fine drill, the dentine was found to be normally sensitive. He inserted a similar tooth in 1851, and several years afterward it was natural in color, and apparently all right. He believed that these two teeth had living pulps years after their removal and replacement.

Dr. Allport referred to a case published by him some years ago, entitled, "Just to please his mother." A central incisor was knocked out, and fell into a puddle of water. A portion of the socket adhered to it. The boy's father brought the tooth to him in his pocket with his tobacco, the boy accompanying him. The tooth was replaced, and retained in place by a ligature of silver wire. On seeing it three or four days afterward, it appeared somewhat loose, and he wired it again. Seven weeks after the accident an alveolar abscess had developed at the root of the tooth. He drilled into the tooth and filled the canal successfully. The tooth retained a good color, and the

abscess was obliterated. This tooth was out of the mouth about two and a half hours, though in the published report he had said an hour, lest he might be disbelieved.

Dr. John Allen reported a case of a patient, thirteen years old, who had four front teeth knocked out. He washed the teeth, and tied them in place by a silk ligature, and afterward with a gold wire. They had been out two or three hours, but became reattached to the sockets.

Dr. Acree reported a case of a sound tooth taken out in 1858, and replaced immediately. Last April it appeared to be a perfect tooth.

Dr. Berry referred to a case of a transplanted tooth found in the practice of one of his neighbors (Dr. Allen), which had lasted many years.

Dr. Fuller said that the success of such cases depends very much on the health of the patient. He reported a case of two teeth replanted in the mouth of a patient eighteen or nineteen years old. They did well for eighteen or twenty years, and then gave trouble, and were afterwards extracted. He thought this was evidence that they had never had a true vital connection with the system during all those years.

Dr. Herriott reported a case of a young lady who had a second bicuspid removed by accident or mistake. It was promptly replaced, and, at the end of three months, appeared to be all right. This was in 1857. About six months ago he saw that tooth, decayed to the pulp cavity, and the pulp alive. His records of the case assured him that there was no mistake as to the identity of the tooth. (Dr. H. has promised a fuller report of this case for publication).

Dr. Taft thought that many in our profession failed to give their patients the best that our science affords for want of faith in the recuperative powers of the constitution, and want of confidence in their ability to accomplish what is desirable. This want of faith is often fatal. A man seldom succeeds in that which he regards as impossible, or even impracticable. A majority are incredulous about the capabilities of Dental surgery, because not familiar with the vital powers of the system. They do not study the histology and physiology of the human being

sufficiently, and are, consequently, as likely to be wrong as right in their treatment of many cases. And want of faith—unbelief—in many cases retards progress more than want of knowledge. The man that believes that he *can*, and is determined that he *will*, seldom fails in any department of Dental surgery.

He referred to the case of replanted teeth reported by Dr. Watt. He would not charge the doctor with want of faithfulness in reporting the case, but he would say that he had understated the difficulties. He was at Dr. W.'s when that patient first called. He was a pale, delicate, cadaverous young man, not yet recovered from a day of dissipation. Dr. W. asked his opinion as to the propriety of replacing the teeth. In view of the dried condition of the teeth, the fractured socket, the bruised mouth, and the defective constitution of the patient, he rather advised against it. I supposed, said he, the doctor had returned to his operating room simply to dismiss the patient. After some time, he came in, stated he had reset these teeth, and sent the patient in search of the other one. Dr. W. had watched the case daily ever since, and he had opportunity to see it occasionally; and the progress has been, all the time, satisfactory, and the present condition is satisfactory. Now, he would like to know how many members of this Association would have had sufficient confidence in the recuperative energies of the system to have replaced those teeth. Yet this, he said, was not so marvelous as the restoration of bony tissues lost by syphilitic or other disease; but we have seen constitutions, loathsome and rotten, restored to health and society.

An important element of success in Dental surgery, after knowledge and faith, is compatibility between patient and operator. He sometimes found patients that it was a pleasure to work for; and after working hard all day for such patients, he felt stronger than in the morning. Then he found others that he could scarcely operate for at all; and he was now in the habit of declining to work for such. He also found some apparently neutral; he could work for them about the same as if they were wooden men. He regarded it as impracticable to perform first-class operations where much incompatibility existed.

Dr. McDonnell inquired if any had successfully replanted teeth for patients past the prime of life.

Dr. Kilbourne spoke of a case in which a portion of a tooth was recently extracted, which he was told had been replanted when the patient was forty-eight years old. He stated he once extracted two first molars from a lady, removed the pulps, filled them with tin foil, and replaced them "just for a joke." Six or seven years afterward they were in the mouth, and comfortable.

Dr. Kennicott said such cases as had been detailed this evening had ceased to sound strangely to him. At fifteen years of age his front teeth were all loosened, and the two lower centrals knocked out. There was also a transverse fracture of the lower jaw, and he was unconscious from the injuries sustained. The physician called to the case was ten miles away. At the solicitation of his brother, the teeth were replaced. The face became much swollen and very painful. The accident confined him to his bed for two months. The result was good. Thirty years after the accident an abscess formed at the root of one of the replaced teeth. The upper centrals were out of the sockets, but hanging by the gums. Years ago these teeth were filled by his brother. The pulps were then exposed and alive, and they are alive yet. He also mentioned a case of successful transplanting. The pulp was dead.

Dr. Black spoke of a case in which four incisors were out, and the cuspids hanging by the gum. They were all replaced, and were doing well several years afterward; and he believed the pulps were alive, as the dentine was normally sensitive.

THIRD DAY—MORNING SESSION.

The morning was mostly taken up by reports, selecting the place for the next meeting, and the reading of a voluntary essay by Dr. Allen on the "Physical History of Various Nations, etc.," consequently but little time could be spared for discussions.

The committee on Operative Dentistry having been called, and not responding on account of temporary absence,

Dr. Flagg called the attention of the Association to "Mor-

gan's Plastic Gold." He remarked that he appeared in a new role; but he proposed to play it fairly. He was not a huckster, nor a dealer in gold, but he had some of the "plastic gold" that he would sell to members who wished to test or use it, and also instruments adapted to its use. He was not induced to pursue this course on account of any pecuniary advantage to himself, but only for the good of the profession. In his own practice he was eclectic—was in the habit of practically testing everything that promised good results; and it was, probably, a knowledge of this trait of his character that induced the proprietor of the "plastic gold" to submit it to his inspection, at an early period of its history.

This gold, he said, is possessed of uniform texture, is easily introduced, and admits of a fine finish. It was a perfect relief, in view of a difficult operation for a more difficult patient. Even a tyro could fill a crown cavity in a third less time than with foil. He would claim for this gold "relative" uniformity. Absolute uniformity was probably not attainable. Different results would be obtained from the same battery, as there are many modifying circumstances. He had been using the "plastic gold" nearly five months, and found it nearly uniform. The worst specimens of it he had seen, were nearly as good as the best of any other make. He would not say "out loud" that a good filling can be made with it in two minutes; but he would say "in a whisper, just so it could be heard," that it can be made in less time. He referred to the morning anxiety of the operator in view of a hard and difficult day's work, and said that with this gold all that is avoided, as the most difficult operations become pleasant. He claimed for it greater purity than is found in any variety of foil; said it was hard enough for a good filling, while it is much more easily filed and burnished than foil.

In regard to manipulating it, he said the instruments should have open, but not deep serrations. The points should be large, their condensing surfaces having a larger area than those of foil pluggers. The pieces of gold should be picked up with thumb pliers, not with the plugger. Both the gold and the instruments that he now offered for sale, he said, had been in-

spected by Dr. Ellis who was the agent for the sale of the gold.

THIRD DAY—AFTERNOON SESSION.

After some miscellaneous business, the report on Operative Dentistry was submitted, accepted and referred. Remarks on it being in order,

Dr. Taft said he felt it to be necessary to notice a little, a statement made in the forenoon, by Prof. Flagg. The intention, no doubt, was good; but the speech was certainly calculated to mislead. The gold referred to was similar to what we have seen for the last ten or twelve years, hence we need not be led away by its novelty. If taken as a guide in practice, great mischief is likely to result from the statement that a tooth can be properly filled in two minutes, or less. He had failed to find anything approximating this. Haste, at the expense of efficiency, must be regarded as very bad practice. Those rapid manipulators are not so accurate as those who take the proper amount of time.

Dr. Bogue approved of the use of crystal gold; but rose mainly to state that he had not obtained satisfactory results in treating sensitive dentine with sulphate of morphia as recommended by Dr. Chase. He had found acetate of morphia, creosote, and tannin combined, a good application.

Dr. Russell said we know that soft gold foil saves teeth. Too short a time has elapsed to know whether this new preparation will or not. He aimed to keep his gold straight, used cylinders, and finished the condensation by driving pieces of gold wire into the plug with a mallet. To fill properly, he said, time is necessary. A tooth can't be plugged with amalgam in two minutes, nor in *five*.

Dr Barker wished it understood that he had no sympathy with the extravagant praise bestowed on the "plastic gold" by Dr. Flagg.

Dr. Walker supposed he was the first to use Lamm's gold; and though he liked it, he could not make "two forty time" with it.

MICROSCOPIC ANATOMY OF THE TOOTH.

Professor Cutler having read his paper on the microscopic anatomy of the tooth, which was accepted, and referred for publication,

Dr. Spalding said it was the duty of Dentists to settle these questions for themselves and for mankind; and he was glad to find we have a worker among us competent and willing to settle them by observation and demonstration. He hoped the profession would give him all possible aid, as on these matters we have hitherto had to take the statements of those outside of our profession. He knew of no one heretofore who had traced the nerve fibrils from the pulp through the outer pulp membrane. He had tried to account for the sensibility of dentine, without the presence of nerve fibrils; but a new field has been explored, and he was as ready as any one to rejoice in the new light which had been made manifest. He hoped we would now all go to work with more determination than ever to settle all these questions, and trusted all would be ready to yield to demonstrated facts.

Dr. Atkinson said the Association was scarcely able to form a decent committee of members capable of judging of this paper. It was generic in its character, and unique in its nomenclature. He would take decided exception to its nomenclature—petrifaction and ossification are distinct processes. And he recognized no such thing as open mouths in any vascular system. There are two characters of nerve cells, white and gray. He maintained that in living teeth the tubuli contained no organic matter. The nerve cells are too large to pass into the tubuli. A nerve cell passing into a tubule would be like putting an ox into a tumbler glass.

Dr. Kennicott inquired if this statement was made on the basis of observation or speculation.

Dr. Atkinson claimed that he spoke from actual observation. He said we had no good glasses till within ten years, nor very good ones till within the last six years. He claimed, notwithstanding the paper, that a calcified pulp does sometimes adhere to the walls of the pulp cavity. Every tissue has its specific

cell, and when seen isolated may be mistaken for a mere globule.

Dr. Fitch stated that some recent observers claim that the nerve fibrils do not terminate at all.

THIRD DAY—EVENING SESSION.

The discussion of Dr. Cutler's paper being continued,

Dr. Judd said he was always glad to hear of researches with the misroscope. All papers, he said, have more or less defects, and if this one has, it becomes us to be very cautious about endorsing it. (He was reminded that the constitution requires a disclaimer, as to the endorsement of the sentiments of any paper, to be prefixed to the published transactions.) The nomenclature of a science he regarded as important; and he was not willing to have the impression go abroad that the generally received idea of the profession is that the blood globules circulate in the Dental tubuli. The paper appeared to read as if no research had been made heretofore as to the contents of the Dental tubuli; or the termination of the filaments. Tomes saw a filament, but did not risk his professional reputation by asserting it to be a nerve fibre. He, (Dr. Judd) however, believed it to be such, but not true nerve. We are indebted to Tomes for this knowledge, a fact which the paper appeared to ignore. He disagreed with the remark of Dr. Cutler in regard to interglobular spaces. He regarded them as a reality, and not a deception resulting from defective mounting. He had seen them, even in specimens not mounted at all. He considered them abortive attempts to form lacunæ. He thought secondary dentine would be found oftener in the centre of the pulp than elsewhere. He regarded it as perfect dentine.

Dr. Taft said that Dr. Cutler's paper was so much in accordance with his own views, that he could not but be favorably impressed by it. Perfection had not been claimed for it, either by its author or his friends. He did not like the spirit of the first two speakers in reference to it, in their assuming that the writer is behind the times; nor was the insinuation that the observations were made with an inferior instrument called for, when none of them had inspected it, and when the author had

the same facilities for obtaining the best glasses that any one had. Years ago he had come to the same general conclusions, as set forth in the paper, in reference to the permeation of the dentine by nerve fibrils, not so much, perhaps, from microscopic observations, as from collateral researches. He had not found secondary dentine as described by Dr. Judd. The tubuli were not well defined—he had never seen them well defined in secondary dentine, either in the pulp or crown of the tooth. Instead of being "perfect dentine," as claimed, it is often more like cementum than like true dentine.

Dr. Chase said he was astonished at the many new positions taken by the paper. He had specimens, mounted and not mounted, showing the interglobular spaces. He opposed the theory of open mouthed vessels; and he thought there was not sufficient care in the use of the terms "calcification" and "ossification." Lime salts may be calcified so as to resemble glass in texture; but in ossification there must be bone corpuscles.

Dr. Horton said we have nerves of motion, and nerves of sensation. He would inquire if there is any tissue that can perform either of these functions vicariously.

Dr. Atkinson answered yes! and gave as an illustration the gelatinous portion of the tooth, as in "tooth-edgedness," in which case the neural ghost is offended, and the offender may be driven out by an alkali. In regard to the fibrils, he said atmospheric air will coagulate the albumen in the dentine, hence, we cannot prepare a section for observation dry. The dentinal fibrils are coagulated *liquor sanguinis*. In extracting the pulp they will be broken off; but by splitting a section, and separating the fragments with dissecting needles, they may be preserved for examination. These fibrils are *post mortem* bodies.

Dr. Judd stated, in reply to the remarks of Dr. Taft, that in criticising the paper it was not his intention to be either personal or disrespectful.

Dr. Cutler said, if the paper abounded in old fogyish ideas, and was so entirely behind the times, would the gentleman give him a list of the authors that would teach him. He was well pleased with the attention the paper had received. He wanted it sifted—not as the President and Dr. Allen have told us flour

is sifted, so as to take the good out of it, but—as wheat is sifted from the chaff. He had spent three months, almost night and day, in the examination of the pulp nerve, and his investigations had only begun.

Dr. Taft had seen the dentinal fibrils, and whether they are nerves or not, he believed they performed the functions of nerves. The theory of oscillation was not satisfactory to him.

Dr. Barker agreed in general with the remarks of Dr. Judd. It appeared to him, that the paper took for granted that some authors assume that red blood circulates in the tubuli. He believed in the existence of the interglobular spaces, and disbelieved in the theory of open mouthed vessels.

Dr. Spalding said he was not going to defend the paper. Its author was fully competent to do that. The position taken in regard to the contents of the tubuli was not in accordance with his preconceived ideas. In the living tooth he thought the tubuli were filled with a fluid which is readily coagulable. In regard to sensibility without the immediate presence of nerve fibres, he thought there need be no difficulty. Actual contact with a nerve is not necessary to sensation, as is illustrated by the skin. He believed no one claimed that nerve fibrils permeate the cuticle. Nerve force, he thought, was not an exception to the law of correlation. He had favored the oscillatory theory; but if the other was demonstrated he was ready to change.

Dr. Wetherbee said, Dr. Spalding's theory was plausible, but not sound. Suppose the pulp to be altogether wanting—to be completely ossified—and the deposit as sensitive as the nerve itself, he would inquire how Dr. S. would explain the sensibility on the oscillatory theory.

Dr. Spalding had never seen such a case.

Dr. Wetherbee had seen such, and went on to report a case in which a portion of the canal was obliterated by ossific deposit, and yet the central portion of the pulp was alive and normal. Some doubt was expressed as to the completeness of the obliteration in the canal, but the doctor thought he could not be mistaken.

Dr. Cutler made a few remarks in reference to the oscillatory

theory of sensation in the dentine. He described minutely the anatomy of the ear, showing its perfect adaptedness to the transmission of undulations, and did the same in regard to the eye, and inquired if there was anything analogous in the structure of the tooth.

A few more remarks were made which the reporter failed to hear, when the Association adjourned.

FOURTH DAY—MORNING SESSION.

OPERATIVE DENTISTRY.

Dr. Atkinson regarded this as the most important department of Dental surgery; and the most important point in it is diagnosis. More frequent failures, and greater mischief result from want of a proper recognition of the morbid conditions, than from any other cause. How few, he said, know how to clean the teeth, and how few appreciate the importance of doing it properly. If it were thoroughly impressed on every one that *teeth perfectly clean can not decay*, a great practical point would be gained. All operations on the teeth should be performed with reference to their being kept clean afterward. This, he said, was too often overlooked. He regarded floss silk as almost indispensable in keeping the teeth clean. He recommended the use of the wedge in separating teeth, and opposed the old method of keeping a wedge between the teeth for ten days at a time. It was better, and altogether practicable, to do the needed wedging at a single sitting. He opposed rubber wedges, as they often caused the death of the Dental ligament, and sometimes of the periosteum. Wooden wedges he thought altogether preferable.

The preparation of the cavity, he said, was a very important part of the operation. He had no confidence in any one filling tortuous cavities properly. They should be thoroughly opened up. Nor had he any confidence in two minute-fillings. He could not clearly describe the process of preparing a cavity; but he could show any one how to do it.

Dr. Spalding said that in filling with cylinders, he used adhesive foil. He was aware that this was not the common prac-

tice. Some had told him they had found difficulty in using adhesive foil in this way, but he thought this would be overcome by a little perseverance. He thought it would be admitted by all that adhesive is preferable to non-adhesive foil.

Dr. Morgan said *opinion is not fact.* Non-adhesive fillings have lasted longer than any others. And it was a mistake to infer that adhesive foil is purer than non-adhesive, as foil may contain six per cent. of alloy and still be adhesive. He had not found the latter as plastic as the non-adhesive.

Dr. Wetherbee did not use cylinders, as he could have his gold in a more convenient form, and save much of the time spent in preparing the cylinders. He did not think a "soft foil" filling will last as long as a welded one, although the non-adhesive gold is as pure as the adhesive. For extreme cases he greatly prefers the latter; and if it is better for such cases, he thought it was evidently better for all, and required less skill on the part of the operator. He rolls his foil into a rope, and cuts into pellets, and anneals to a "cherry red." Being asked what species of cherry, he said that, when used in reference to annealing or tempering metals, the phrase refers to the color of the wood, not the fruit. He claimed that alloyed foil is hardened by annealing.

For the margins of cavities, he preferred foil to crystal gold. When the pulp inflames after filling, and there is too much pain to admit of the removal of the plug, he drills into the pulp cavity to relieve the pressure, and when the pain abates he removes the plug, treats the canal and fills. He generally removes the pulp in twenty-four hours after applying arsenious acid, and fills as soon as the hemorrhage is arrested. He objected to the use of cotton in the canal; regarding its use as confessing a lack of ability, and something else. When the pulp is but slightly exposed, and healthy, he covers the exposed point with oxychloride of zinc, and after this has hardened, he trims it as needed, and fills over it with gold. He was not aware of having made any failures in this practice.

Dr. Black had followed similar treatment and practice with exposed pulps; but had changed his course on account of so many failures.

Dr. Shadoan thought Dr. Wetherbee's inference as to the success of his practice was drawn from an observation too limited. He thought that golden foil was not usually annealed with sufficient care. In tempering steel broaches in the flame of a spirit lamp, they are sometimes burned, and are often left as brittle as ever by cooling too suddenly. But when they are heated to the proper temperature in an iron tube, and left to cool with it, they will be found almost as tough as threads. He thought the same properties would be manifested with gold, but to a less extent. Annealed in the spirit-flame, parts of the foil will be found hard, and inclined to work into balls under the plugger. He preferred adhesive foil.

Filling over exposed pulps had proved satisfactory in his practice. As far as reported back to him, there was probably not more than one failure in fifty cases; but that did not prove that some of them were not reported as failures, elsewhere. He had recently tried the form of cap recommended a few years ago by Dr. Rogers, of Utica. The cases are doing well; but the time was too short to justify reporting them as successful.

Dr. Wetherbee said he used the oxychloride of zinc as a cap, because it could be applied with less pressure than anything else, adhered to the walls of the cavity, and had the desired degree of porosity.

Dr. Morgan wished to notice a few points. The softest foil will make a plug that will wear equal to enamel. Soft foil plugs have lasted longer than adhesive gold has been known. Adhesive is harder than non-adhesive foil, and hence, requires stronger pressure to adapt it to the walls of the cavity. Serrated points are regarded as necessary in using it. With these, he said, it was impossible to have the mass as compact as may be had by using smooth points and soft foil.

Dr. Kennicott said there need be no difference in the degree of compactness. He did not approve of serrated instruments, even for adhesive foil. He had made a point of this, at the Boston meeting, in the report on Operative Dentistry. The welding principle, and not mere mechanical attachment, should be relied on in making an adhesive filling. In welding, the particles are brought into actual contact. When foil is perfo-

rated by serrated instruments, masses of it may be held together by mechanical attachment, without being welded. He described an instrument with which he claimed to weld gold without perforating it. Instead of definite serrations and points, its condensing surface is composed of smoothly rounded prominences, these, and the depressions between them, being finished like a burnisher. The condensing face of the instrument is twice bisected with a small round file, the bisections being made at right angles with each other. Four prominences will result, which are to be rounded and made smooth, as above described. Different sizes may be prepared, and the point of the instrument may stand at any desired angle with the shaft. He uses the instrument with both rotary and undulatory motion combined with direct pressure. He uses it in welding adhesive foil, and greatly prefers it to serrated points.

In addition to the ordinary modes of keeping the plug dry while operating, he kept it warm by heating the pellets as he introduced them. When the plug was a little warmer than adjacent substances, the vapor of the breath would not condense on it. He said gold should be freshly annealed to drive off gases and vapors that become condensed on its surface.

Dr. Cutler inquired what gases condense on gold foil.

Dr. Kennicott replied he did not know.

Dr. Watt answered, whatever gases were present in the atmosphere, the most condensable in the greatest proportion. Sulphuretted hydrogen and ammonia would be found prominent in this city.

Dr. Kennicott stated, in resuming, that he had found by experience that foil exposed for half an hour needed re-annealing. He was glad to hear the advanced views expressed in regard to capping nerves. It had been a common practice with him for eighteen years. He thought the best practice on this was getting to be generally recognized, though the progress of opinion in reaching it had been very fluctuating. He preferred a rigid cap to arch over the point of exposure, and a plastic non-conductor in absolute contact with it. Pure gold and gutta percha fulfilled these requirements. He had faithfully tried the oxychloride of zinc, but regarded gutta percha as preferable.

Dr. Butler regarded the instrument described by Dr. Kennicott as about equivalent to one with shallow serrations. He said, when gold is absolutely dry, it can be welded with a burnisher, but, as we can not have it thus dry in the mouth, we must have instruments to break its surface in condensing. The atmosphere had considerable influence. He had found it more difficult to weld gold in Cincinnati than in Cleveland.

Dr. Kennicott thought his instrument was quite different from a serrated one. With the latter, rotary motion would be impracticable. It was an important movement in using the other.

Dr. McClellan said that if the curves were changed to angles on the condensing surface of Dr. K's instrument, it would be the same as his favorite.

He favored the use of crystal or sponge gold. In treating recent and slight exposure of the pulp, he applies dry oxychloride of zinc over the exposed point, caps over this with the same material, as used in filling, and fills over it with gold. The oxychloride has this advantage over other caps, that it adheres to the walls of the cavity.

Dr. McKellops asked how Dr. Kennicott would apply his instrument in posterior proximal cavities?

Dr. Kennicott said, he would open up until all parts were accessible. And, while on his feet, he would ask Dr. Wetherbee, how it happens that annealing hardens alloyed foil, while it softens alloyed plate.

Dr. McKellops referred to Dr. Arthur's method of serrating instruments, by scratching them with a file. Such pluggers leave no "rat holes." He uses both varieties of foil, and was very particular to get his foundation right, mostly beginning with a cylinder, without having made a retaining point. He found the wedge, and the rubber dam important aids in keeping the cavity dry. He uses Lamm's gold in connection with pellets and cylinders, making the borders of the plug of foil. He believed absolute dryness in the mouth to be impracticable. A patient could not endure a plug hot enough to prevent the condensation of vapor on it. He was opposed to filling immediately after the removal of the pulp.

Dr. Taylor said he had, for a long time, entertained the idea

of writing out his views on filling teeth, and especially his early experience in the use of blocks or cylinders, and he was now, more than ever, confirmed in his intention to do so. He rolled his foil with pliers or tweezers into cylinders, and was having an instrument made for the purpose when Dr. Clark introduced the broach. Early in his practice he had been driven by necessity to make an instrument similar to the one described by Dr. Kennicott; and his mode of introducing the gold was about as described by Dr. McKellops. In proximal cavities, when practicable, he makes an inclined plain at the cervical wall, and builds against it, so that the pressure inclines the gold inward, rather than outward. He disliked serrated instruments, as they tended to cause porosity of the filling, and consequent loss of the tooth.

FOURTH DAY—AFTERNOON SESSSION.

MECHANICAL DENTISTRY.

Dr. Herriott reported a case: A soldier, at the battle of Mission Ridge, was struck by a fragment of a shell, which took away his nose, and a part of his mouth. He had been left for dead, but revived; and after reaction had been established, his cheeks were cut loose from their attachments and brought forward. A nose was formed from the tissues of the forehead, but the operation failed on account of erysipelatous inflammation. He made for him a vulcanite nose and upper lip, attaching an artificial mustache to the latter. The piece is held in place by a rubber ligature, and a pair of spectacles. He exhibited a photograph of the patient before the operation, showing a frightful deformity, and another, showing his present appearance, which is so natural that the gentleman goes into society without attracting special attention.

Dr. Dunn described his recent improvement in "porcelain base." The teeth are moulded and "biscuited," then adapted to the mouth and body for the plate, the teeth and plate being baked together. He claimed that this gave a more natural expression to the teeth than could usually be obtained by carving, and as full control of the position of the teeth as is possessed in continuous gum work. He is secured by letters patent.

Dr. McClellan referred to his introduction of the wire gauze work. Now he was experimenting with a new material, or composition, which he hoped would give good results. He would exhibit specimens to show the progress he was making; but as his experiments were by no means complete, he was not yet ready to answer questions. The specimens were very light and smooth, approximating a gum color, and the teeth appeared to be firmly attached to the plates.

Dr. Atkinson referred to a composition for plates gotten up and patented by Dr. Colburn, of Newark, New Jersey. He said it was composed of vegetable gums and metallic oxyds.

Dr. Fitch showed specimens of Dr. Colburn's plate material. He said it could be made in three hours. It adheres to the teeth so firmly that pins are not necessary; and by its use, the teeth may be attached to metallic plates. Dr. F's only fear in regard to it was lack of strength. He stated that Dr. C. proposes to sell material, rather than office rights.

Dr. Kennicott reported three cases of mercurial ptyalism, caused, since our last meeting, by wearing rubber plates.

Dr. Gibson described a process of attaching teeth to plates, by vulcanite rubber, which had been suggested by looking at a nutmeg grater. He uses it for temporary pieces. When the gold plate is properly swaged, he lays it in the counter die, and with a triangular steel punch, he makes holes through it, around the border, as far as the vulcanite attachment is to extend. The teeth are to be held in place with wax; the moulding, packing and vulcanizing are to be conducted as usual. When completed, it will be found that the rubber has penetrated the holes, firmly holding the teeth in position. He thought the profession failed to properly appreciate continuous gum work. While it is recognized by all as the highest style of Dental art, but few use it.

Dr. Barker said it might be inferred from the tenor of the discussions, that none who are present use rubber, but he had been told by dealers that they still sell that kind of teeth. He was doubtful about the ptyalism, reported by Dr. Kennicott, having been caused by rubber plates, the vermilion used in coloring them not being soluble in the fluids of the mouth. The ptyal-

ism of these patients may have been the effect of mercury taken twenty years ago.

Dr. Allen said his had been a boundless ambition, in this department of the profession; and his reward, pecuniarily, had been less than nothing. He then gave a brief lecture, clearly setting forth the philosophical and physiological principles which constitute the basis of this department.

Dr. Sill asked and obtained a brief indulgence to report a case not pertaining to mechanical Dentistry: On the 2d of July, he extracted fourteen teeth for a lady, using nitrous oxyd. On the 5th of the same month, her babe, four months old, died. The physician in charge, reported the case as a death from nitrous oxyd.

Dr. Osmond, not being a member, was on motion allowed to describe an artificial velum which he had constructed for the relief of cleft palate. He had made the anterior portion of hard, and the posterior of soft rubber. He reported the result as satisfactory to the patient and to himself.

Dr. Harroun, being called for, said that Dr. Bogue and he had never met before, but on comparing notes, found they had been traveling the same road. They would endeavor, jointly, perhaps, to lay their views before the profession. He described some of the important points to be observed in this work. A condensed report can not do justice to the subject, hence the reader is referred to the promised report by himself and Dr. Bogue.

Dr. Bogue said, that when the principles are clearly understood, it is not much more difficult to make an artificial velum than a set of teeth.

Dr. Atkinson inquired if he would adapt an artificial velum when the fissure affected only the soft palate; to which he responded affirmatively, adding that such were the easiest cases.

Dr. Shadoan described a method of making gold work, his directions being about as follows: Use twenty carat plate, and roll to number 30 of the American gauge plate. Swage accurately, and cut out a central portion the size and shape for the "air chamber." Re-swage, to insure accuracy. Antagonize and adjust the teeth to the plate, using the rubber block teeth.

Then get a correct impression of the margins of the gums, and the edge of the plate. Swage, adapt, and solder on a gold rim, number 35 of the same gauge plate. Replace the teeth and wax, trim the wax to the proper shape, and make a mark in it from heel to heel of the plate, about one-eighth of an inch from the crowns of the teeth, so that its counterpart in the plaster model will be a guide in cutting the plate about to be described. Now fill with wax the cavity cut in the plate already swaged, letting the wax extend slightly over the margins of the plate. Then take a plaster impression of the inside of the teeth and the plate thus waxed. Prepare dies and swage a number 32 plate to correspond. Trim and adjust, making the posterior corners come accurately in contact with those of the outer rim. Remove the teeth and wax, and solder the two plates together, first at their posterior margins, then carefully all around the air chamber, which must thus be made thoroughly air-tight.

When the soldering is completed, replace the teeth and hold them in position with wax. In making the mould, invest so as to cover the outer surface, allowing the plaster to extend over their cutting and grinding surfaces. When the mould is ready, remove the wax, pack with rubber, and vulcanize. The work will be found quite stiff and strong ; it makes a neat appearance, and is very easily repaired. A new block can be fastened in place with Wood's alloy.

FIFTH DAY—MORNING SESSION.

DENTAL PHYSIOLOGY.

Dr. Judd said he would make a few remarks on the papers read by Dr. Chase. There was sometimes a want of clearness in the use of the term absorption, from failing to observe the conditions in which it is used. That a tissue may be absorbed, it must be alive ; and when the absorption of a solid, as the root of a tooth, is spoken of, it must be understood that it becomes liquid before the process is completed. He was not satisfied as to what becomes of the inorganic matter of the temporary root—whether it is taken up into the general system or used in the formation of the new tooth.

Dr. Atkinson approved of Dr. Chase's second paper. It was

certainly true that fluidity, as well as vitality, is essential to absorption. All things differ but in degree, as may be illustrated by motion, one degree of which results in heat, another in light, etc. The origin of motion being in infinity, the simplest motion is our primate. He said our nomenclature is defective. That which is sometimes called a "dead tooth" is one that has lost only one degree of its vitality. In speaking of the disposal of the materials of the temporary root, he claimed that a metamorphosis between matter and spirit is possible. In the process of absorption, the solid must pass to a state of fluidity, then to "gasidity," and, finally, to spirit, when it can go out without let or hindrance. He illustrated his idea by the burning of gunpowder. When the combustion is not complete there is *debris*. Matter being the *debris* of spirit, when the metamorphosis is obstructed, there is disturbance. This you may call combustion, or what you please. We use the terms creation, and evolution. What is the difference? And what do we mean?

Dr. Spalding explained the general principles of absorption, and said we should remember that force is not destroyed. When an organic substance has ceased to perform its function it is dead; and when once dead, it does not live again in the same condition or form. So when a temporary root has lost its vitality, it does not enter the living circulation, but is thrown off as effete The temporary tooth has performed its part, and can perform no other. He could not go as far as his friend who had just spoken. He did not believe that matter is changed into spirit. There is a limit. We can put no more matter into this material universe, nor can we destroy any that is in it. He did not want the doctrine that matter may be changed into spirit to go forth as the sentiment of this Association. It *changes*; but it does not cease to be matter. There can be no destruction of either force or matter.

Dr. Atkinson replied, "no destruction? now I say, there is nothing but destruction!" He believed in destruction or annihilation, and cared but little which term was used. (This speech was continued for some time with great earnestness, but the reporter could not preserve even a skeleton of it.)

Dr. Chase said the solids of the absorbed root are thrown out of the system mainly by the kidneys.

Dr. Judd was not ready to subscribe to all of Dr. Spalding's positions. He could see no reason why the lime salts of the temporary teeth could not be appropriated by the general system, in the way of nutrition.

Dr. Chase said, "if what is in me is taken up and re-appropriated, why must I eat at all?"

Dr. Cutler inquired if effete matter is not sometimes used by the general system, as when carbon is reconsumed to sustain combustion and furnish animal heat. He said it was important to inquire what it is that dissolves the lime salts of the temporary root, the principal one, the sulphate being insoluble in most media. It is a *salt*—a union of an acid with a base. The phosphoric acid may be driven off by other acids. In this case it must be displaced by an acid that forms a soluble salt with lime; for an insoluble salt could not pass the cell walls, nor even the capillary vessels nor the membranes. The chloride of calcium is a highly soluble salt; and there are others that might be formed. The lime thus thrown off, is eliminated through the kidneys. Tissues broken down by oxydation are given off as oxyds. The tissues are thus broken down, and are replaced or built up by deposits of plastic lymph, etc. When these processes cease, death is the result.

Dr. Atkinson said, then, after all, this is but a difference in nomenclature; and there is no dispute! This shows that we must *come up* to the plain of friendly conversation, and the darkness will vanish, and misunderstandings will be wiped out. Speech-making is but a poor substitute for friendly talk. When we "knock dignity into a cocked hat," we arrive at clear pronouncements of truth; and we understand each other.

Dr. Peebles said that progress in science is like growth in religion, when we "become as little children" we grow.

Dr. Cutler could cordially join in calling this a Dental revival.

Dr. Spalding regarded it as the most glorious day of his professional life.

Dr. Cutler said this was the second general meeting of the

profession he had attended; and he had never felt so encouraged in his whole life before. He would begin his professional career anew.

Dr. Lawrence told an Irish anecdote to prove that he felt happier than all the rest.

Dr. Berry alluded to his long acquaintance with the profession and expressed his gratification at the evidence of progress exhibited by this meeting. He said we had a right to feel happy; for if the meeting had done nothing but call out Dr. Cutler's paper, it was a decided success.

The President briefly and eloquently thanked the members for their kindness to him, and for their earnestness in the cause of science; and the Association adjourned *sine die.*

AMERICAN DENTAL ASSOCIATION—Meets annually (this year at Niagara,) *Pres.* A. Lawrence of Lowell, Mass., *Rec. Sec.* J. Taft, of Cincinnati.

List of Societies represented in the American Dental Association.

ALBANY DENTAL ASSOCIATION—Meets monthly at Albany. *Pres.* Robert Nelson, *Rec Sec.* W. F. Winne, *Cor. Sec.* B. Wood, of Albany.

BUFFALO DENTAL SOCIETY—Meets monthly at Buffalo. *Pres.* W. G. Oliver, *Rec. Sec.* M. F. Cook.

BROOKLYN DENTAL ASSOCIATION—Meets semi-monthly *Pres.* W. C. Parks, *Rec. Sec.* Wm. C. Horne, of Brooklyn.

CINCINNATI DENTAL SOCIETY—Meets semi-monthly at Cincinnati. *Pres.* B. D. Wheeler, *Rec. Sec.* C. M. Wright.

CENTRAL OHIO DENTAL ASSOCIATION—Meets Semi-annually on the second Tuesday of May and November. *Pres.* Dr. M. DeCamp, Mansfield, O., *Sec.* M. A. Spencer, Daylstown, O.

CENTRAL STATES DENTAL ASSOCIATION—Meets semi-annually. The Annual meeting at Louisville, Ky., during the Holidays. The Semi-annual on the second Tuesday of April. *Pres.* Dr. W. G. Redman, *Sec.* W. H. Shadoan, Louisville, Ky.

CENTRAL NEW YORK DENTAL ASSOCIATION. Meets semi-annually. *Pres.* S. B. Palmer, *Rec. Sec.* S. G. Martin, *Cor. Sec.* P. Harris of Skaneatles.

CHICAGO DENTAL SOCIETY—Meets monthly at Chicago. *Pres.* S. B. Noble, *Rec. and Cor. Sec.* A. E. Brown, of Chicago.

CONNECTICUT VALLEY DENTAL ASSOCIATION—Meets semi-annually, second Tuesday of May and October, *Pres.* J. Beals, *Rec. Sec.* L. D. Shepherd, of Salem, Mass.

CONNECTICUT STATE DENTAL ASSOCIATION—*Pres.* T. J. Metcalf.

DELAWARE DENTAL ASSOCIATION—Meets semi-annually. *Pres.*————. *Cor. Sec.* Samuel Marshall,

HUDSON RIVER ASSOCIATION OF DENTAL SURGEONS—Meets on the third Thursdays of May, September and January. *Pres.* E. D. Fuller, Peekskill. *Rec. Sec.* L. S. Straw, Newburg.

HUDSON VALLEY DENTAL ASSOCIATION—meets monthly at Troy, N. Y. *Pres.* T. R. Draper, *Rec. Sec.* E. J. Young, *Cor. Sec.* L. C. Wheeler, of Troy.

ILLINOIS STATE DENTAL SOCIETY—Meets annually. *Pres.* H. N. Lewis, Quincy. *Sec.* G. T. Smith, Princeton, Ills.

INDIANA STATE DENTAL SOCIETY—Meets annually at Indianapolis on the last Tuesday of June. *Pres.* W. F. Morrill, *Rec. and Cor. Sec* J. F. Johnson, of Indianapolis, Ind.

IOWA STATE DENTAL SOCIETY—Meets semi-annually Jan. and July. *Pres.* L. C. Ingersoll, *Rec. Sec.* H. S. Chase.

LAKE ERIE DENTAL SOCIETY.—Meets on the 24th Sept at Westfield, N.Y. *Pres.* A.B. Robbins.

LEBANON VALLEY DENTAL ASSOCIATION—*Prest.* W. K. Brenizer, *Sec.* S. H. Guilford.

LOUISVILLE DENTAL SOCIETY—Meets on the first Tuesday of each month. *Pres* ———, *Cor. Sec.* W. H. Shadoan.

MAD RIVER VALLEY DENTAL SOCIETY—Meets quarterly. Next meeting in Xenia, on the third Monday of December next. *Prest.*, N. W. Williams, *Sec.*, G. L. Paine.

MARYLAND ASSOCIATION OF DENTISTS—Meets the last Thursday of every month *Pres.* Robt. Arthur.

MICHIGAN DENTAL SOCIETY—Meets annually second Tuesday of Oct. at Detroit. *Pres.* J. A, Harris, of Pontiac *Rec. and Cor. Sec.* Geo. Leary, Adrian.

MISSISSIPPI VALLEY DENTAL ASSOCIATION—Meets annually in March at Cincinnati, *Pres.* W. H. Goddard, *Rec. Sec.* G. W. Field, *Cor. Sec.* C. M. Wright, of Cin.

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